REMOVAL ACTION WORKPLAN

Proposed Mountain Oaks Charter School
and
Mountain Ranch Community School
1250 Pool Station Road
San Andreas, Calaveras County, California

Prepared for
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Condor Project No. 4660C

CONDOR

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EXECUTIVE SUMMARY

May 3, 2006

This Removal Action Workplan (RAW) has been prepared by Condor Earth Technologies, Inc. (Condor) for the proposed Mountain Oaks Charter School (grades K–12) and Mountain Ranch Community School (grades 6–12) (together referred to as "Site") located in San Andreas, California. The RAW identifies how naturally occurring asbestos (NOA) in Site soils will be mitigated to protect human health. This RAW has been prepared pursuant to a Schools Cleanup Agreement between the Calaveras County Office of Education (CCOE) and the California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC).

The selected removal action remedy will be on-Site containment of NOA-containing materials. A detailed cost estimate for the selected remedy is included in Appendix D. Implementation of the selected remedy may include the following sequence, depending on logistical processes employed by the contractor:

- Grading and other earthwork operations on the Site in preparation for construction.
- Construction of hardscape areas including buildings.
- Construction of utility trenches and other preparations for subsurface infrastructure.
- Installation of geotextile visual barrier.
- Installation of subsurface utilities.
- Installation of imported soil cover in landscape areas. Imported fill material will conform to current DTSC guidance on imported fill for school Sites.
- Landscaping installation (vegetative cover).
- Operations and Maintenance to ensure perpetual integrity of containment cap.

All applicable or appropriate and relevant requirements will be followed during the course of the mitigation action, including dust mitigation and air monitoring during earthmoving activities, worker safety, stormwater pollution prevention, public participation, and reporting requirements.

LIMITATIONS TO EXECUTIVE SUMMARY

This executive summary should only be read as a brief summary, and not as a complete discussion of the full report text. The scope of work and limitations should be understood prior to reading the Site-specific information, results, and discussion.

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1.0 INTRODUCTION

This Removal Action Workplan (RAW) has been prepared by Condor Earth Technologies, Inc. (Condor) for the proposed Mountain Oaks Charter School (grades K–12) and Mountain Ranch Community School (grades 6–12) (one school, together referred to as "Site") located at 1250 Pool Station Road in San Andreas, Calaveras County, California, (Figures 1 through 4, Appendix A) to address the mitigation of naturally occurring asbestos (NOA) identified in Site soil. The entire 7.74-acre Site requires mitigation and management actions for NOA. This RAW includes an evaluation of mitigation options, description of the selected remedy, and the goals to be achieved by the mitigation action, as required by the California Health and Safety Code (H&SC) Section 25323.1. This RAW is also consistent with the criteria specified in the H&SC Section 25356.1(c).

Condor was retained by Calaveras County Office of Education (CCOE) to conduct environmental assessments on the Site. The only identified environmental condition for the Site was naturally occurring asbestos (NOA). Concentrations of NOA were detected in Site soil samples ranging from 0.016 to 0.33% asbestos by weight. Concentrations of NOA are greater than the California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC) action level of 0.001% by weight for TEM analysis identified in the *Interim Guidance for Naturally Occurring Asbestos at School Sites,* Revised 09/24/04. Based on these results, DTSC agreed with Condor's recommendation of further action at the Site in a letter dated February 14, 2006 (Appendix B).

There are sufficient data to support the mitigation and management action as proposed in this RAW for the Site. Due to the physical nature of NOA, any on-Site releases would likely occur during disturbance of the soil from earthwork and associated construction. Condor and DTSC recommended that action be performed to mitigate and manage the identified potential threat to Site occupants and the general public prior to construction of the proposed school.

1.1 REMOVAL ACTION OBJECTIVES

The objective of this RAW is to develop a strategy for the completion of all earthwork and construction activities that effectively mitigates the potential threat to human health associated with the presence of NOA at the Site. The proposed removal action identifies the preferred remedy in terms of three evaluation criteria: effectiveness, implementability, and cost.

The following Removal Action Objectives (RAOs) have been established for NOA that are protective of human health and reduce the potential for exposure to NOA-containing soil encountered at the Site:

1. Minimize the exposure of humans to NOA in soils through the single exposure pathway for NOA: inhalation.
2. Mitigate and manage all soils located within the Site boundaries that exceed the human health risk criteria [based on concentrations of NOA set forth by the Cal/EPA DTSC of less than

0.001% by weight for TEM analysis] now and in the future. Reduce or prevent the exposure of NOA to any and all individuals associated with the Site.

3. Minimize potential for migration of NOA from the soil to air.
4. Obtain a conditional Site approval decision from DTSC for the Site, after completion of the mitigation action and prior to any school occupancy.

The remedial goals developed and adopted for the NOA present at the Site will be responsive to these RAOs. The primary remedial goal for the Site is performance-based and is focused on reducing the hazards in regards to NOA-containing soil.

2.0 SITE BACKGROUND

The CCOE is planning to build a community and charter school at the Site. Additional Site background information is available in the *Geological and Environmental Hazards Assessment Report* dated August 9, 2005, and the *Preliminary Environmental Assessment Report* dated December 30, 2005, both prepared by Condor.

2.1 SITE LOCATION AND DESCRIPTION

The approximately 7.74-acre Site is located on a southwestern portion of Assessor's Parcel Number (APN) 044-001-023 (approximately North Latitude 38.19000 and West Longitude 120.694200). The Site vicinity has historically been used for low-density cattle grazing and is currently listed as open land. State Highway 49 is located approximately 0.5 miles to the northeast and Pool Station Road is located approximately 250 feet east of the Site. Downtown San Andreas is located 0.65 miles northeast of the Site.

2.1.1 Site Name and Address

The Site is identified as the proposed Mountain Oaks Elementary School by the CCOE. The address associated with the Site parcel is 1250 Pool Station Road in San Andreas, California. The Site is a portion of property owned by the Performing Animal Welfare Society, Inc (PAWS), an animal sanctuary.

2.1.2 Contact Person, Mailing Address, and Telephone Number

John Brophy of CCOE, is the designated contact person. Mr. Brophy may be reached by telephone at (209) 736-4662 or by mail at Calaveras County Office of Education, P.O. Box 760, Angels Camp, CA 95221.

2.1.3 EPA Identification Number and CalSites Database Number

The review of selected regulatory agency databases and files conducted for the *Geological and Environmental Hazards Assessment Report,* dated August 9, 2005, did not reveal any United States Environmental Protection Agency (USEPA) database numbers for the Site. The Site Code is 104511-11.

2.1.4 Assessor's Parcel Number (APN) and Map

The Site is designated as an approximately 7.74-acre portion of the 77-acre property designated by APN 044-001-023. A map indicating the parcel and Site boundaries is included as Figure 3, Appendix A.

2.1.5 Ownership

The Site parcel is currently owned by Performing Animal Welfare Society, Inc (PAWS). Ms. Pat Darby is the director and owner contact person.

2.1.6 Township, Range, Section, and Meridian

The Site is located in Section 19, Township 4 North, Range 12 East on the San Andreas, California, United States Geological Survey (USGS) 7.5-Minute Topographic Map (1962), Mount Diablo Base and Meridian.

2.2 OPERATIONAL HISTORY AND STATUS

The Site is currently listed as open grassland, has no animals, and is not occupied by any structures.

The Site parcel has historically been used for ranching purposes (low-density cattle grazing) since at least 1962.

Aerial photographs and USGS Topographic Maps indicate that the Site has been open land without structures since at least 1902. There have been no changes, other than an unimproved access road that trends north to south noted on the 1947 topographic map, until the present.

2.3 TOPOGRAPHY

According to the San Andreas, California, USGS 7.5-Minute Topographic Map, dated 1962, the Site is at approximately 1,040 feet above mean sea level (msl). The USGS map indicates that the terrain of the Site and immediate area is characterized by undulating hills and drainages, along with surface slopes ranging from two to eleven degrees toward the east and southeast.

2.4 GEOLOGY AND HYDROGEOLOGY

The Site geologic and hydrogeologic information were gathered primarily from the *Geologic and Environmental Hazards Report* prepared by Condor on August 9, 2005, for the Site.

2.4.1 Site Geology and Soil Types

General Geologic Setting

The Site is located on the western slope of the central portion of the foothills of the Sierra Nevada Mountain Range, part of the Sierra Nevada Geomorphic Province. The Sierra Nevada Mountain Range is a northwest-trending range formed by the exhumation of the Sierra Nevada Batholith. The Site is located near the east extent of the Foothills Fault System, a fault system showing no evidence of Quaternary activity.

Local Geologic Setting

The Site and immediate vicinity are covered with soil and colluvium, with very sparse rock outcrops. According to published geologic maps, the Site is underlain by multiple rock types, including slate, schist, greenstone, serpentinite, greywacke, conglomerate, and limestone. Serpentinite was observed in road-cuts located immediately northeast and a road-cut south of the Site along Pool Station Road. During the Geotechnical Engineering Study (GES), several test pits were excavated on Site, exposing weathered serpentinite beneath two to ten feet of overburden (soil and colluvium). Serpentinite is a rock unit known to contain naturally-occurring asbestos and is likely the source of NOA in Site soils.

Site Soils

The near surface soils are composed generally of medium reddish brown, dense, silty sand with varying amounts of silt and gravel. Heavy organics consisting of rootlets and native grasses are present in the upper 3 inches. Residual soil was encountered in all 10 test pits excavated at the Site during the GES and is derived from the complete in-place weathering of the underlying metamorphic bedrock. Residual soils encountered consisted of very stiff to hard, medium reddish brown and greenish gray silt with gravel. Trace amounts of sub-angular gravel and sand are present in the residual soil locally. The depth of residual soil ranges from 2.2 to 9 feet below grade.

Seismic Setting

No known active or potentially active faults cross the Site and the Site is not located in a Fault-Rupture Hazard Zone as established by the Alquist-Priolo Earthquake Fault Zoning Act (Hart, 1994). Faults of the Foothill Fault System pass closest to the project area (0.12 kilometers) with the Great Valley Trust Fault Zone (Segment 7) being the next closest active fault (88 kilometers southwest of the Site).

2.4.2 Site Hydrogeologic Setting

No water well records from the State of California Department of Water Resources (DWR) were available for the Site vicinity. Permanent groundwater is anticipated below a depth of 50 feet from existing grade. Topographic gradients are generally towards the southeast, suggesting a southeasterly groundwater gradient.

The South Fork of the Calaveras River is located approximately 4,400 feet west of the property.

2.5 SURROUNDING LAND USE AND SENSITIVE ECOSYSTEMS

Surrounding land use is primarily rural open range land, with a low-density residential development located approximately ¼ mile northeast of the Site (Figure 5, Appendix A). Regarding sensitive ecosystems, the Initial Study completed for the Site (Mitigated Negative Declaration for the Proposed Mountain Ranch Community School and Mountain Oaks Charter School, Calaveras County Office of Education) states the following:

> Biological Resources. The proposed site is currently an undeveloped pasture used for cattle grazing. Based on site observations, no habitat for endangered and/or special species is likely. Based on site conditions, there is no suitable natural habitat for sensitive species. For the purposes of this investigation, sensitive (special status) species are those species that are federally and/or state listed species, proposed for listing, candidate species, or species of concern.
>
> Due to the existing nature of the site and lack of suitable habitat, no special status species are expected to occur within or near the project area. No significant biological impacts are expected to occur as a result of this project. No wetlands have been observed on or adjacent to the site.

Therefore, it does not appear that there are sensitive ecosystems that would be affected by the project.

2.6 METEOROLOGY

The climate for San Andreas is generally considered to be semiarid with an average annual rainfall of 31 inches and a mean annual air temperature of 60 degrees Fahrenheit (°F) (National Weather Service). The majority of the annual rainfall occurs during the months of November through April. The average daily temperature ranges from a minimum of 46°F in January to a maximum of 76°F in July. Precipitation is infrequent during the summer months in San Andreas.

Prevailing winds in San Andreas are typically range from southwest to northwest annually (Appendix C). Historical weather data are readily available for the Esperanza RAWS station, located 10 miles east of the Site. A wind rose map for this station is included in Appendix C.

2.7 REGIONAL RADON INFORMATION

The USEPA developed a set of three regional zones based on average indoor radon levels: Zone 1 (radon levels greater than 4 picoCuries per liter (pCi/L), Zone 2 (radon levels between 2 pCi/L and 4 pCi/L), and Zone 3 (radon levels less than 2 pCi/L). The USEPA recommends that radon levels at or above 4 pCi/L be reduced (USEPA, 2002). Calaveras County is considered to be in the USEPA Radon Zone 2.

2.8 PREVIOUS SITE ACTIONS

2.8.1 Phase I Environmental Site Assessment

The *Geological and Environmental Hazards Assessment Report*, dated August 9, 2005, identified no recognized environmental conditions, historical environmental conditions, or de minimus conditions associated with the Site. However, Condor recommended that an evaluation for NOA be conducted at the Site due to the proximity of ultramafic rocks to the Site.

2.8.2 Preliminary Environmental Assessment

Based on the findings of the *Geological and Environmental Hazards Assessment Report*, Condor conducted reconnaissance sampling of soil in a Naturally Occurring Asbestos Investigation. The results of the soil sampling were documented in the *Preliminary Environmental Assessment Report* dated December 30, 2005. Surface soil samples contained 0.25, 0.33, and 0.016% asbestos (actinolite and/or chrysotile) by weight according to laboratory analytical results conducted by transmission electron microscopy (TEM). Condor recommended further action in the form of a Removal Action Workplan (RAW) with DTSC oversight to identify NOA mitigation measures protective of human health. The *Preliminary Environmental Assessment Report* was approved in a Further Action Determination letter from Sharon Fair of DTSC, dated February 14, 2006 (Appendix B).

3.0 NATURE, SOURCE, AND EXTENT OF NOA

This section discusses the type and nature of serpentinite distribution, the source of the NOA, and the extent of the NOA impacts to soil at the Site.

3.1 TYPE, SOURCE, AND LOCATION OF CONTAMINANTS

The Site was historically used as low-density grazing land. The PEA analytical results indicate that NOA soil exists throughout most of the Site and likely in the surrounding vicinity. NOA identified as actinolite and/or chrysotile was detected in three of the four samples at concentrations greater that the DTSC action level of 0.001 percent asbestos by weight. The maximum asbestos concentration detected was 0.33 percent in the surface soil sample labeled PA2. Due to the serpentinite bedrock identified beneath Site surface soil and the Pool Station road-cuts adjacent to the Site, it is likely that bedrock also contains NOA. For the purposes of this RAW, the entire Site is assumed to contain NOA in soil and bedrock.

3.2 HEALTH EFFECTS OF CONTAMINANTS

The human health effects of asbestos are primarily related to inhalation of airborne asbestos fibers. Asbestos fibers in rock and soil are released into the air by disturbing these media, especially when significant quantities of dust are generated. Once introduced into the lungs, asbestos fibers are not easily

purged from lung tissue. The health effects of asbestos fiber inhalation include respiratory disease (asbestosis), mesothelioma, and lung cancer.

The relationship between asbestos concentrations in soil and what asbestos concentrations may be expected in air during soil and rock disturbance is not currently well understood. Therefore, a quantitative human health risk assessment with corresponding cancer risk evaluation cannot currently be performed. As a result, conservative mitigation measures protective of human health are required at proposed school sites. Please refer to the most current DTSC guidance regarding NOA for further information (Appendix B).

3.3 TARGETS POTENTIALLY AFFECTED BY THE SITE

The primary targets that may potentially be affected by the Site are humans occupying the Site, both during construction (workers) and after construction (students and staff). Secondary targets that may be affected by Site activities are nearby residents.

4.0 RISK EVALUATION

For reasons stated previously in Section 3.2, a human health risk assessment cannot currently be performed. An ecological screening risk evaluation cannot currently be performed because of the lack of available information regarding the ecological effects of NOA. However, based on the Initial Study for the Site, the project is not anticipated to have a significant impact on biological resources.

5.0 ENGINEERING EVALUATION/COST ANALYSIS (EE/CA)

This Engineering Evaluation/Cost analysis (EE/CA) was conducted for the mitigation of soil contamination at the Site according to United States Environmental Protection Agency (USEPA) guidance as presented in *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA* (USEPA, 1993). It was prepared, as part of the RAW developed for the Site, to aid in the evaluation of remediation alternatives for the mitigation of contaminated soils at the Site.

The remedial action at the Site has been determined to be a non-time-critical mitigation because the release or threat of release of contaminants is not critical based on Site considerations and the nature of the contamination. DTSC has requested that the removal action be conducted in accordance with protocols of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

Under Title 40 of the Code of Federal Regulations (CFR) 300.415 of the NCP, an EE/CA is required to address the implementability, effectiveness, and cost of a non-time-critical removal action. This EE/CA will be used as the basis for the planned non-time-critical removal action. As the lead agency, DTSC has final authority of the recommended alternative selected and of overall public participation activities.

5.1 IDENTIFICATION OF REMOVAL ACTION ALTERNATIVES

This RAW covers all identified contamination (NOA) at the Site. The following alternatives identify the possible methods to address how NOA can be managed and/or mitigated at the Site.

5.1.1 Alternative 1: No Action

This alternative involves taking no action with respect to mitigation of NOA on the Site.

5.1.2 Alternative 2: Excavation and Disposal of NOA-Containing Materials

This alternative includes physical removal of NOA-containing materials (soil and rock) and off-Site disposal.

5.1.3 Alternative 3: In-situ Remediation

This alternative would involve a method for chemically or physically altering the NOA without removal to a condition that would no longer present a human health or environmental threat.

5.1.4 Alternative 4: On-Site Containment of NOA-Containing Materials

This alternative involves isolating the NOA from contact with Site occupants by means of institutional controls including on-Site containment and administrative measures.

5.2 EVALUATION OF REMOVAL ACTION ALTERNATIVES

A screening process was used to evaluate the applicability of options to mitigate the NOA at the Site based on effectiveness, implementability, and relative cost.

5.2.1 EE/CA Criteria

The following criteria were used to evaluate the removal action alternatives:

Effectiveness

- Performance and reliability to handle and/or treat the chemical constituents, media volumes, and physical conditions present at the Site.
- Impacts to human health and the environment during field activities and implementation of the treatment technology.
- Overall protection of public health and the environment.
- Compliance with the Applicable or Relevant and Appropriate Requirements (ARARs).
- Long- and short-term effectiveness.
- Ability to meet the RAOs presented in Section 1.1.

Implementability

- Capability of the technology with respect to space limitations, equipment availability, utility requirements, and operational, maintenance, and monitoring concerns.
- Ability of the technology to meet applicable federal, state, and local regulations and permitting requirements.
- Ability of the technology to meet the project schedule and facility operations requirements.

Cost

- Assess the relative cost of each technology based on estimated fixed or capital cost for construction or initial implementation and ongoing operational and maintenance costs.

5.2.2 Analysis of Removal Action Alternatives

A screening evaluation was performed to assess remedial technologies and define options for mitigating the impacted soil present at the Site. Based on the RAOs presented in Section 1.1, four (4) alternatives were identified and analyzed for the removal action at the Site.

5.2.2.1 Alternative 1: No Action

While the No Action alternative was not considered by DTSC, it was evaluated (as required under the NCP) as a baseline to which the relative benefits of the other alternatives could be compared. This alternative fails all of the RAOs stated in Section 1.1 and must be eliminated as an alternative.

5.2.2.2 Alternative 2: Excavation and Disposal of NOA-Containing Materials

Physical removal of NOA-containing materials would meet the RAOs stated in Section 1.1, except that NOA-containing rock would likely still remain (serpentinite bedrock). This alternative would therefore still require on-Site containment (Alternative 4), and would be cost-prohibitive and must be eliminated as an alternative.

5.2.2.3 Alternative 3: In-situ Remediation

A method for chemically or physically altering NOA into a non-hazardous state does not currently exist.

5.2.2.4 Alternative 4: On-Site Containment of NOA-Containing Materials

Isolating the NOA from contact with Site occupants by means of institutional controls including on-Site containment and administrative measures would be effective, implementable, cost-effective, and would meet the RAOs.

5.3 DESCRIPTION OF SELECTED REMEDY

The selected removal action remedy will be Alternative 4: on-Site containment of NOA-containing materials. A detailed cost estimate for the selected remedy is included in Appendix D. Approximately 2.89 acres of the Site will be covered with hardscape construction, and approximately 4.85 acres of the Site will be landscaped. Implementation of the selected remedy may include the following sequence, depending on logistical processes employed by the contractor:

- Grading and other earthwork operations on the Site in preparation for construction.
- Construction of hardscape areas including buildings.
- Construction of utility trenches and other preparations for subsurface infrastructure.
- Installation of geotextile visual barrier.
- Installation of subsurface utilities.
- Installation of imported soil cover in landscape areas. Imported fill material will conform to current DTSC guidance on imported fill for school Sites.
- Landscaping installation (vegetative cover).
- Operations and Maintenance to ensure perpetual integrity of containment cap.

6.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Previous investigations of the Site indicate concentrations of NOA that may pose a risk to human health. Based on the Site-wide distribution of NOA, the most effective remedial action has been determined to be on-Site containment and isolation of NOA-containing materials. This section discusses the applicable or relevant and appropriate requirements (ARARs) for the proposed remedial solution.

6.1 SUMMARY OF LOCAL, STATE, AND FEDERAL REQUIREMENTS

The Federal, State of California, and County of Calaveras requirements for this project fall under the following regulatory agencies and/or statutes:

- California Environmental Protection Agency (DTSC)
- California Air Resources Board, Calaveras County Air Pollution Control District
- Occupational Safety and Health Administration (California OSHA)
- California Regional Water Quality Control Board (stormwater pollution prevention)
- California Environmental Quality Act (CEQA)

6.2 ARARS FOR INSTALLATION OF ENGINEERING CONTROLS

6.2.1 Public Participation

A baseline community survey will be conducted by DTSC's Public Participation Program using telephone interviews with five community members or representatives. Depending on the response received from the community, DTSC may conduct further community interviews and solicit community comments via a public meeting concerning the proposed removal action. DTSC will assist in determining if enough public interest and concern has been expressed in order to hold a public meeting regarding the proposed removal action. A meeting will be held by the Calaveras County Office of Education School Board regarding the Site and proposed removal action. A Public Participation Plan (PPP) has not yet been prepared for the Site. Should there be a significant amount of public interest; a PPP will be prepared upon DTSC approval of this RAW. The PPP would be based on the information from a variety of sources including file review, Site visits, demographic data, community survey and interviews, and discussions with representatives of local elected officials.

A public notice will be published in local newspapers and posted at the Site in clearly visible locations informing the community of this proposed soil removal (cleanup) action and of the availability of the administrative record file for public inspection at two established Information Repositories. The public notice will be published in local newspapers. Copies of the PEA report and this RAW will be placed in the Information Repositories for access by community members. In addition, a Fact Sheet in English and Spanish (if necessary) will be circulated to all residences and businesses within one-quarter mile of the Site. The Fact Sheet will provide the general background and updated information about the Site.

In addition, neighbors within line-of sight of the project will be notified of construction activities at least seven days prior to the start of school construction.

There have not been any community members or representatives of local elected officials that have indicated the community was concerned with the environmental investigations or environmental conditions at the Site.

6.2.2 Hazardous Substance Management (Cal EPA / DTSC)

Hazardous wastes are not anticipated to be removed from the Site. Asbestos is not a designated Federal Hazardous Waste (RCRA) and California has designated asbestos a hazardous waste in substances with concentrations greater than 1% by weight. All hazardous wastes will be properly managed in compliance with Federal and State laws; and if necessary, manifested and transported by a registered hazardous waste hauler to a hazardous waste management facility in California. All NOA-containing soil will be managed according to this RAW, and fugitive dust will be managed in accordance with the Asbestos Dust Mitigation and Air Monitoring Plan (Attachment C).

6.2.3 Calaveras County Air Pollution Control District

Calaveras County Air Pollution Control District (CCAPCD) has not yet formally adopted the Title 17, California Code of Regulations, section 93105, Asbestos Airborne Toxic Control Measure (ATCM) for Construction, Grading, Quarrying, and Surface Mining Operations. Therefore, the project will be subject to the California Air Resources Board ATCM, and mitigation of fugitive dust during construction will be required. Air sampling and dust monitoring during soil movement activities will be performed in accordance with the ATCM. A detailed Asbestos Dust Mitigation and Air Monitoring Plan is included in Appendix C. DTSC requires that the Dust Mitigation and Air Monitoring Plan be approved or acknowledged by the CCAPCD prior to commencement of construction activities. The CCAPCD contact details are provided below:

Calaveras County Air Pollution Control District
Government Center
891 Mountain Ranch Rd.
San Andreas, CA 95249-9709
APCO - Lakhmir Grewal
E-Mail: lgrewal@co.calaveras.ca.us
Phone: (209) 754-6504
Fax: (209) 754-6521

6.2.4 Health and Safety (Cal OSHA)

All contractors will be responsible for operating in accordance with the most current California Occupational Safety and Health Administration (Cal OSHA) regulations including 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, and 29 CFR 1926, Construction Industry Standards, as well as other applicable federal, state and local laws and regulations. A Site-specific HASP is included as Appendix E. Everyone working at the Site will be required to either be familiar with and adhere to the HASP or possess their own HASP consistent with ARARs.

6.2.5 Storm Water Pollution Prevention (RWQCB)

A Storm Water Pollution Prevention Plan (SWPPP) will be prepared and submitted to the Central Valley Regional Water Quality Control Board (RWQCB) by the construction contractor prior to commencement of construction activities. It will be the responsibility of the construction contractor to provide a SWPPP detailing the contractor's specific methods for storm water pollution prevention. The construction contractor will obtain approval or acknowledgement from the RWQCB prior to construction.

6.2.6 California Environmental Quality Act (CEQA)

The California Department of Education (CDE) considers any land acquisition for school construction is subject to CEQA requirements. According to California Education Code (CEC) Section 17213.2 (e), if a previously unidentified environmental concern is identified during school construction process, the school district will cease construction activities, notify DTSC, and take necessary response actions as required by the lead agency. For the purposes of this NOA mitigation at the Site, DTSC has assumed the role of lead agency and will prepare a Notice of Exemption for the remedial actvities.

7.0 PERMANENT NOA MITIGATION MEASURES

The following section and subsections describe specific NOA mitigation measures to be utilized at the Site. Future human contact with NOA-containing soil and airborne dust from the Site will most effectively and economically be achieved by the following engineering and administrative controls.

7.1 HARDSCAPE AREAS

According to current architectural plans, approximately 2.89 acres of the 7.74-acre Site will be covered with hardscape construction, including buildings and paved areas. The hardscape is considered by DTSC an appropriate mitigation measure to prevent exposure to NOA-containing soil and rock. The hardscape area may contain small areas of landscaping, such as planter boxes and other vegetation. If these small landscape areas are in contact with native soil, they will be managed according to all other landscape areas on the Site as described in subsections below.

7.2 LANDSCAPE AREAS

Approximately 4.89 acres of the 7.74-acre Site will be landscaped and include playfields, lawn areas, and aesthetic landscaping. The mitigation measures for these areas are described in the following subsections.

7.2.1 Geotextile Visual Barrier

Upon completion of grading operations and utility trenching, a visual marker fabric will be installed on top of NOA-containing soil and rock. The fabric may consist of geotextile materials and will be visually distinctive. The purpose of the geotextile visual barrier is to provide a marker and warning to workers that NOA-containing soil or rock is present beneath it when subsurface work is being performed.

7.2.2 Imported Clean Fill Soil

A clean fill soil source will be identified in accordance with the DTSC *Information Advisory: Clean Imported Fill Material*, dated October, 2001 (Appendix B). Once a source of acceptable clean fill soil has been identified and approved by DTSC, a minimum of six inches of clean fill will be placed on top of the geotextile visual barrier. The geotextile visual barrier, clean fill soil, and vegetative cover will provide sufficient encapsulation of NOA-containing soil and rock to prevent exposure.

7.2.3 Embankment Protection

Embankments or cut-slopes are not anticipated to be within the Site boundary. If necessary, cut-slope embankments will be covered by retaining walls, shotcrete, drainage control, or other appropriate measures to prevent erosion and transport of NOA-containing soil onto the Site.

7.3 ADMINISTRATIVE CONTROLS (O&M)

Once the school has been constructed and is ready for occupancy, an Operations and Maintenance Plan (O&M Plan) will ensure perpetual integrity of the mitigation measure. The O&M Plan defines procedures and requirements for long-term operation, monitoring, inspections, data acquisition, reporting, and maintenance. A Draft Operations and Maintenance Plan is included in Appendix H.

8.0 NOA MITIGATION IMPLEMENTATION

The following section and subsections describe specific NOA mitigation activities from Site preparation to completion of construction. All stages of the removal action activities will be monitored by the Site Manager. All personnel working on Site will be required to comply with ARARs discussed in the

previous Section and procedures defined in this implementation plan. As discussed in Section 6.2, all necessary permits or regulatory approvals will be obtained prior to the implementation of removal action activities.

8.1 SITE PREPARATION AND SECURITY MEASURES

Prior to commencement of construction activities, the construction contractor will establish a decontamination area to prevent off-Site migration of NOA-impacted soil. Appropriate warning signage will be installed along Pool Station Road, notifying the public of construction activities and access restrictions. The construction contractor will survey and stake the Site in preparation for grading activities. Construction will begin with vegetation clearing as appropriate, followed by grading, leveling and compaction of the Site.

Access to the project Site shall be limited to construction and oversight personnel. The exclusion zone will be designated as the Site boundary. Appropriate temporary fencing may be installed prior to construction activities to limit Site access. To ensure trespassers or unauthorized personnel are not allowed near work areas, security measures may include, but are not limited to:

- Posting notices directing visitors to the Site Manager.
- Maintaining a visitor's log. Visitors must have prior approval from the Site Manager to enter the Site. Visitors shall not be permitted to enter the Site without first receiving Site-specific health and safety training from the Site safety officer.
- Installing barrier fencing to restrict access to sensitive areas such as exclusion zones.
- The Site Manager and safety officer will ensure unauthorized personnel have no access to work areas and/or contaminated materials.
- Before leaving the Site, all personnel must sign out in the visitor's log.
- Access gates to the exclusion zone will be locked at the close of each workday.

Persons requesting Site access will be required to demonstrate a valid purpose for access and provide appropriate documentation to demonstrate they have received proper training required by the Site-specific HASP (Appendix E).

8.2 CONTAMINANT CONTROL

Appropriate measures will be implemented to ensure contaminant control. The primary mechanism of unwanted contaminant movement is anticipated to be wind-blown fugitive dust. The Dust Mitigation and Air Monitoring Plan (Attachment C) identifies measures to be taken to control fugitive dust and associated contaminant migration.

8.3 FIELD WORK OVERSIGHT AND DOCUMENTATION

In accordance with the Business and Professions Code, Chapters 7 and 12.5, and the California Code of Regulations, Title 16, Chapters 5 and 29, a California registered professional experienced in the identification of NOA will be designated as responsible for keeping a field logbook during the mitigation activities. Field observations, on-Site personnel, equipment arrival and departure times, and other project information will be documented in the logbook.

8.3.1 Field Logbooks

Field logbook entries will be complete and accurate enough to allow for the reconstruction of field activities. The logbooks will document where, when, how, and from whom any vital project information was obtained, as applicable. They will be bound with consecutively numbered pages. Each entry will be dated and the time will be recorded in military time. All entries will be legible, written in black or blue ink, and signed by the author. The entries will be factual, objective, and free of any comments that may be considered inappropriate. If an error is made, corrections will be made by drawing a line through the error and entering the correct information. All corrections will be initialed by the author and dated. No entries will be removed or left unreadable.

At a minimum, the logbook entries will include following for each day of fieldwork:

- Site name and address
- Recorder's name
- Team members and their responsibilities
- Time of Site arrival and departure
- Other personnel onSite
- Summaries of any onSite meetings
- Deviations from this RAW and Site HASP
- Changes in personnel and responsibilities as well as reasons for the changes
- Levels of safety protection
- Calibration readings for any equipment used and equipment model and serial number
- Quantity of import fill material (if applicable) in truckloads

The following information will be recorded during the collection of samples as appropriate:

- Sample identification number
- Sample location and description
- Site sketch showing sample location and associated distance measurements
- Sampler name(s)
- Date and time of sample collection
- Sample matrix
- Type of sample preservation (if applicable)
- Sampling equipment used
- Field observations and details important to analysis or integrity of samples (e.g., heavy rains, odors, colors, etc.)
- Applicable instrument readings (e.g., photoionization detector [PID], etc.)
- Chain-of-custody form numbers and chain-of-custody seal numbers
- Transport arrangements (courier delivery, lab pickup, etc.)
- Recipient laboratory

8.3.2 Chain-Of-Custody Records

Chain-of-custody forms are used to document sample collection data and the shipment of samples to the laboratory for analysis. All sample shipments will be accompanied by a completed chain-of-custody form. The chain-of-custody forms will identify the samples shipped and maintain the custodial integrity of the samples. Generally, a sample is considered to be in a person's custody if it is in a person's possession,

within a person's view, or stored in a secured area restricted to authorized personnel. The samples are considered to be in the custody of the sampler or last custodian until received by the laboratory.

8.3.3 Photographs

Photographs will be taken at the Site as appropriate during the mitigation activities. The photographs will be used to verify information written in the field logbook. Photographs will be noted in the logbook or in a separate field photography log when they are taken. Photograph log entries will include the following information:

- Date, time, location, and weather conditions (if appropriate)
- Description of photographed subject
- Photographer's name

8.4 EARTHWORK ACTIVITIES

The construction contractor will grade and level the Site using on-Site, NOA-containing materials (soil and rock). During all soil movement activities, the Asbestos Dust Mitigation and Air Monitoring Plan will be implemented (Appendix C). Air sampling and dust monitoring during soil movement activities will be performed in accordance with ARARs. Utility trenches will be excavated to appropriate depths prior to installation of the geotextile visual barrier. Once the geotextile visual barrier is installed on top of all exposed NOA-containing soil and rock, clean fill soil will be imported to the Site.

8.5 IMPORTED FILL MATERIAL

Once a proposed source of clean fill soil is identified, sampling will be conducted in consultation with DTSC and in accordance with the DTSC *Information Advisory: Clean Imported Fill Material* based on the source material. Upon approval, clean fill soil will be transported to the Site by trucks and placed on the geotextile visual barrier.

8.5.1 Load Checking

Each load of imported fill to be used onSite will be checked by Organic Vapor Analyzer or similar device and by visual inspection for stained or unusually discolored soil.

8.5.2 Diversion of Unacceptable Borrow

If loads containing unacceptable materials (staining or detectable VOCs) are identified, transporters of the unacceptable loads will be stopped before leaving the Site.

Equipment operators will watch for evidence of contaminated imported fill in loads being dumped at the Site. If contaminated soils are found or suspected, the imported fill soil will be isolated. The hauler of the prohibited materials will be identified and the Site Manager will determine appropriate actions to be taken.

Segregated, unacceptable fill will be removed from the stockpile location immediately. Unacceptable fill will be reloaded to the transporter's vehicle when possible or stockpiled in an appropriate area for later removal by a properly licensed waste hauler.

8.5.3 Documentation of Rejected Loads

All rejected loads and the reasons for rejection will be recorded. Data to be recorded will include when the incident occurred, hauler identification, why the load was rejected, whether the load was dumped prior to rejection, and what steps were taken to remove the rejected material. Additional information may be recorded as appropriate.

A separate area off Site will be maintained for the storage of unacceptable materials, pending removal by the original transporter or a properly licensed waste hauler. Temporary storage of unacceptable soils segregated from dumped loads will be maintained on plastic sheeting and covered. Duration of temporary storage of these segregated materials will be limited to the length of time required to enlist the services of a licensed waste hauler until unacceptable material removal is complete.

8.6 VARIANCE

During the removal action, unexpected conditions may necessitate implementation of minor modifications to mitigation activities as presented in this RAW. Field personnel will notify the Site Manager when unexpected conditions warrant deviations from this RAW. DTSC will be notified when unexpected conditions warrant deviations from this RAW, and a verbal or written approval will be obtained from DTSC before implementing the modifications. Modifications or variances to the approved RAW will be documented in the field logbook and in the Report of Completion for this RAW.

9.0 PROJECT SCHEDULE AND REPORT OF COMPLETION

The CCOE will likely begin construction during the first quarter of 2007. The Gantt chart included in Appendix H indicates the anticipated long-term schedule for this project. A Report of Completion, documenting all activities conducted pursuant to an approved RAW and certifying that all activities have been conducted consistent with this RAW, will be prepared as expeditiously as possible upon completion of the removal action and submitted to DTSC for review and approval.

10.0 REFERENCES

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USEPA. Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA. 1993.

USEPA. Remediation Technologies Screening Matrix and Reference Guide, Second Edition. October 1994.

USEPA. Soil Screening Guidance: User's Guide. July 1996.

USEPA. SW-846: Test Methods for Evaluating Solid Waste, Volume 2. November 1986.

11.0 LIMITATIONS

Condor developed the interpretations and conclusions presented herein in accordance with generally accepted principles and practice within this regional area at the time this document was prepared. Conclusions presented in this report are professional opinions based on limited information obtained at the time the RAW was prepared. Condor has endeavored to determine as much as practical about the Site using conventional practices given our scope of services. Condor makes no representation as to the subsurface conditions at locations or times other than those sampled by our employees and reported in this document. If any changes are made or errors found in the information utilized in this RAW, the interpretations and conclusions contained herein shall not be considered valid unless the changes are reviewed by Condor and either appropriately modified or re-approved in writing.

12.0 QUALIFICATIONS AND SIGNATURES

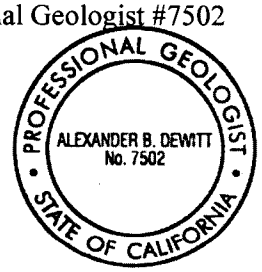
This Removal Action Workplan was prepared by Thereasa Jones and Alexander B. Dewitt (California Professional Geologist #7502). Alexander Dewitt has several years experience conducting school site evaluations and cleanups under DTSC oversight. If you have any questions or require additional information, please call Alex Dewitt at (209) 234-0518.

Respectfully submitted,

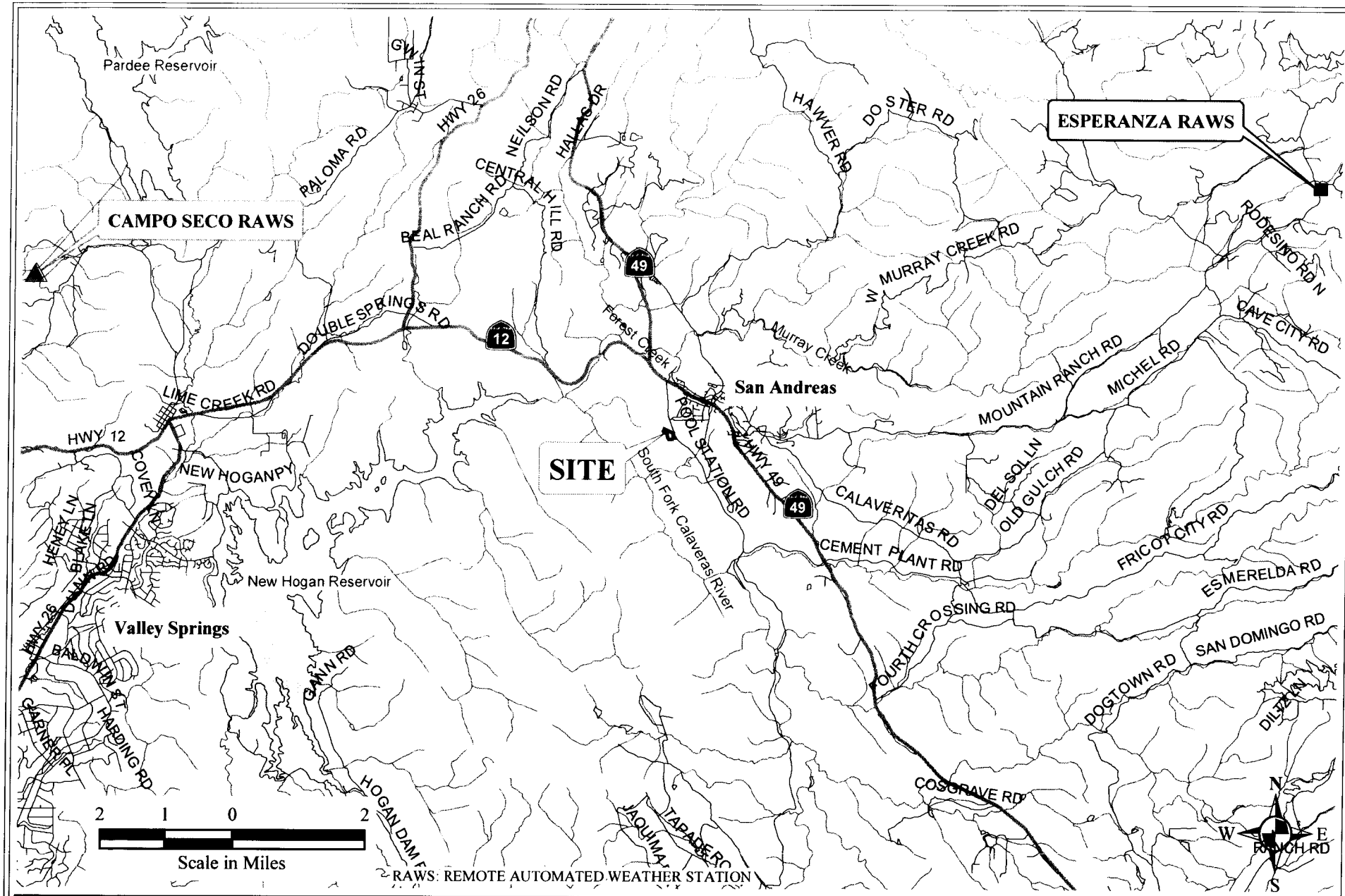
CONDOR EARTH TECHNOLOGIES, INC.

Thereasa A. Jones
Staff Geologist

Alexander B. Dewitt
California Professional Geologist #7502



P:\4000_prj\4660 Calaveras County\4660C NOA Mitigation\Reports\RAW\Mountain Oaks ES RAW.doc



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CONDOR

JOB #	SCALE
4660C	1"= 2 Mi.
DATE	
3 MAY 2006	
COMPILED	CHKD
AWA	ABD

VICINITY MAP
MOUNTAIN OAKS / MOUNTAIN RANCH SCHOOL RAW
CALAVERAS COUNTY OFFICE OF EDUCATION
1250 POOL STATION ROAD
SAN ANDREAS, CALIFORNIA

Figure 1

4660C_RAW_F1.MXD

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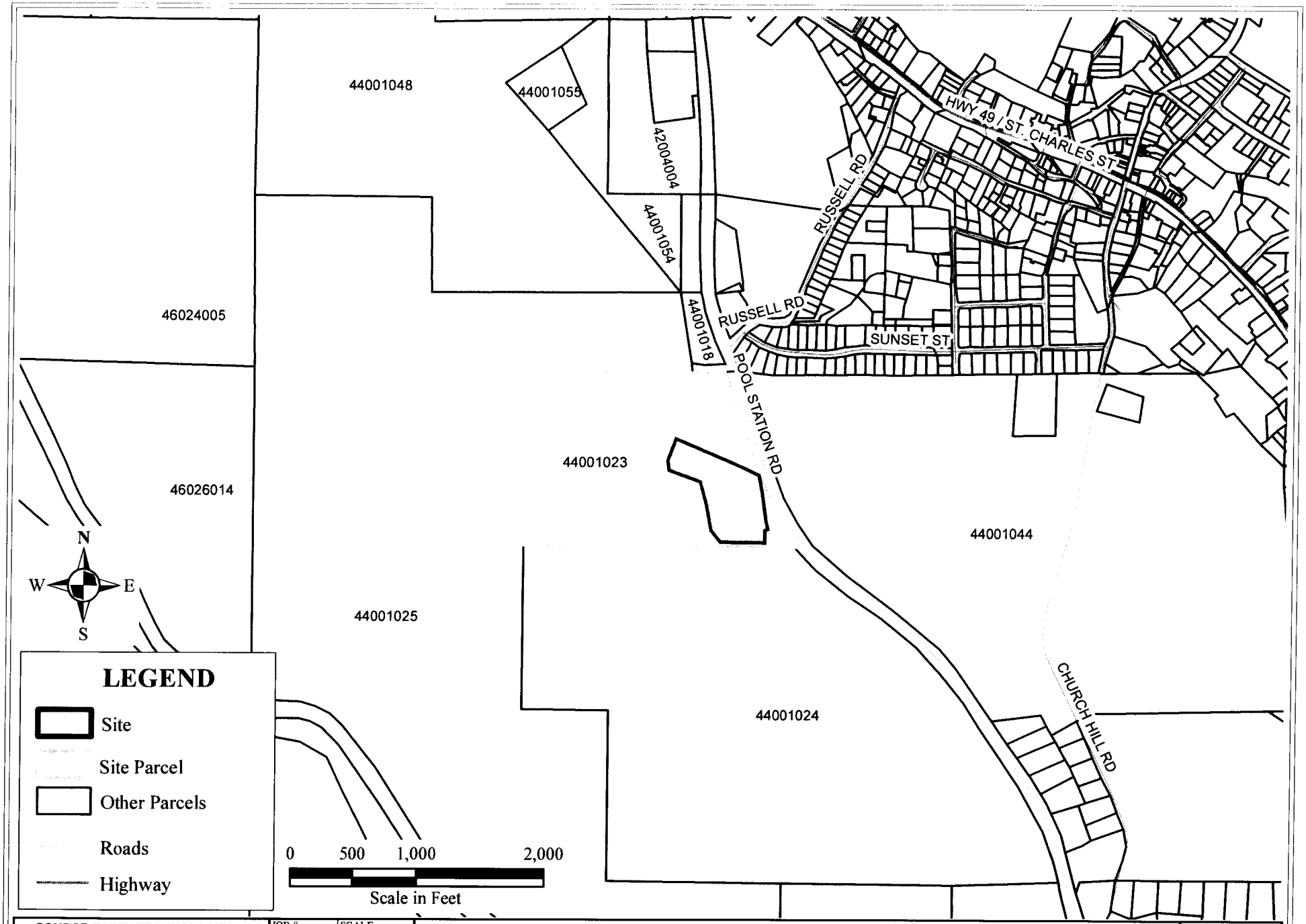
ABD	ABD

SITE MAP
MOUNTAIN OAKS / MOUNTAIN RANCH SCHOOL RAW
CALAVERAS COUNTY OFFICE OF EDUCATION
1250 POOL STATION ROAD
SAN ANDREAS, CALIFORNIA

Figure
2

4660C_RAW_F2.MXD



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APN MAP
MOUNTAIN OAKS / MOUNTAIN RANCH SCHOOL RAW
CALAVERAS COUNTY OFFICE OF EDUCATION
1250 POOL STATION ROAD
SAN ANDREAS, CALIFORNIA

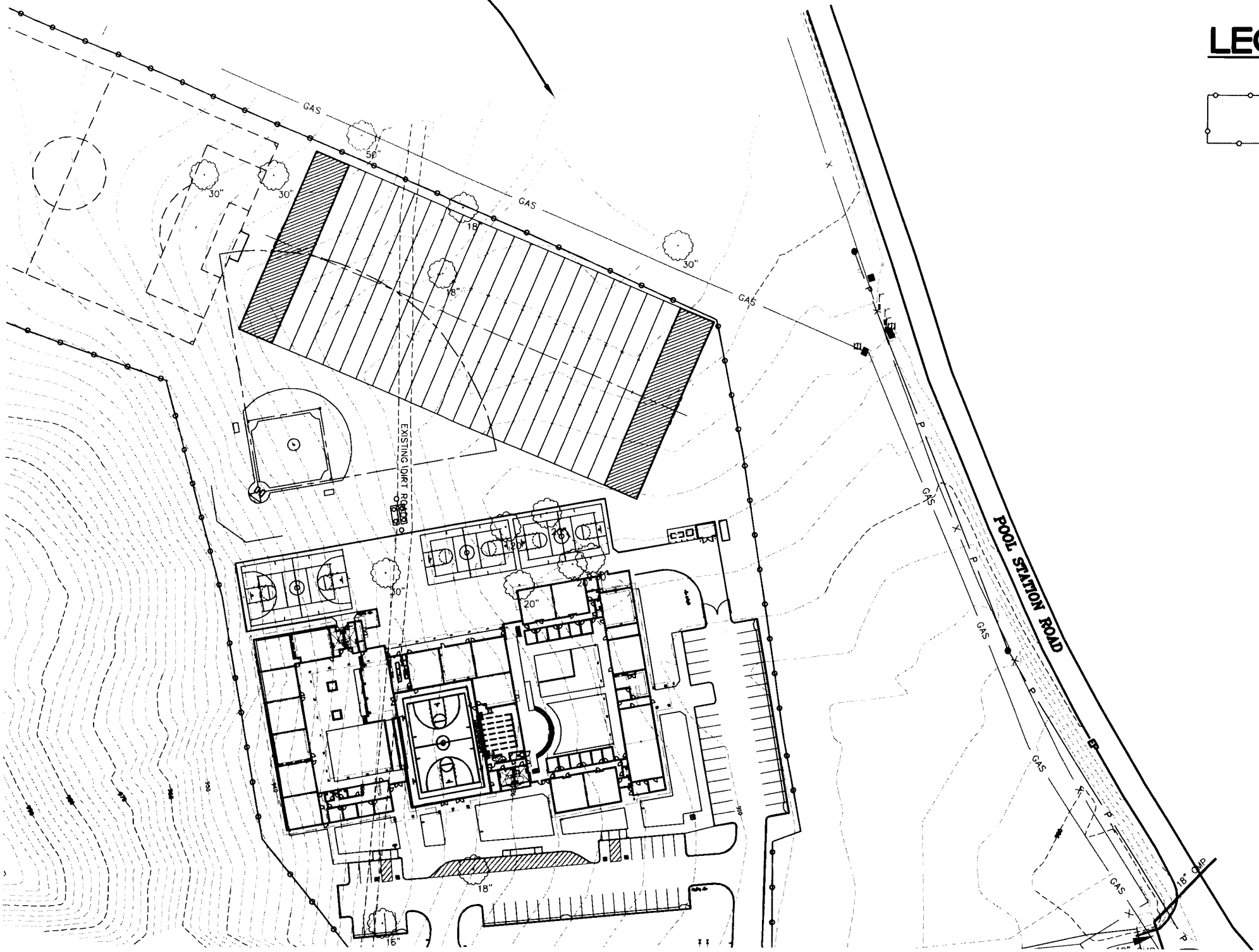
Figure
3

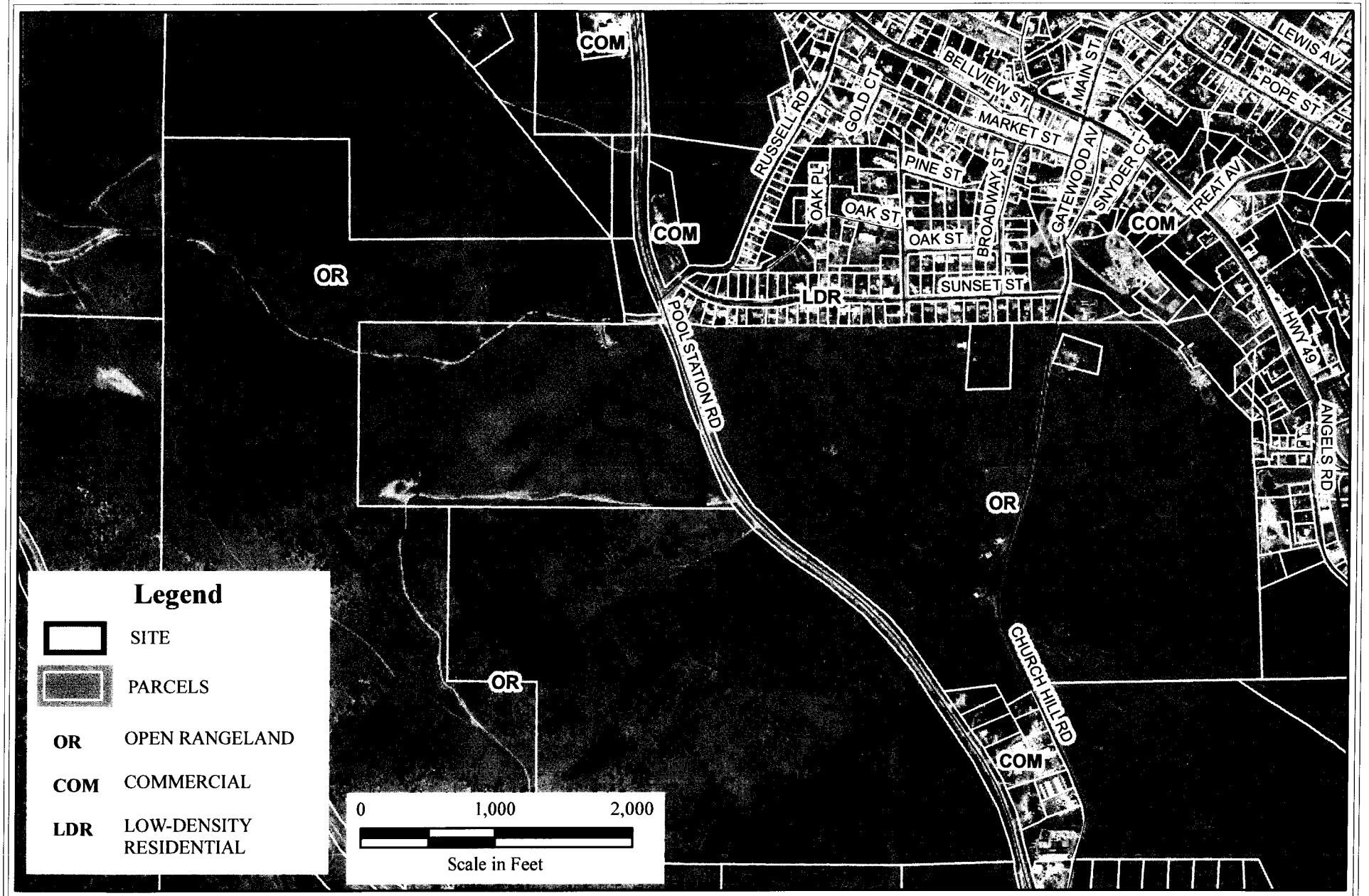
4660C_RAW_F3.MXD

EXISTING SURVEY TOPOGRAPHY

SCALE IN FI

LEGE





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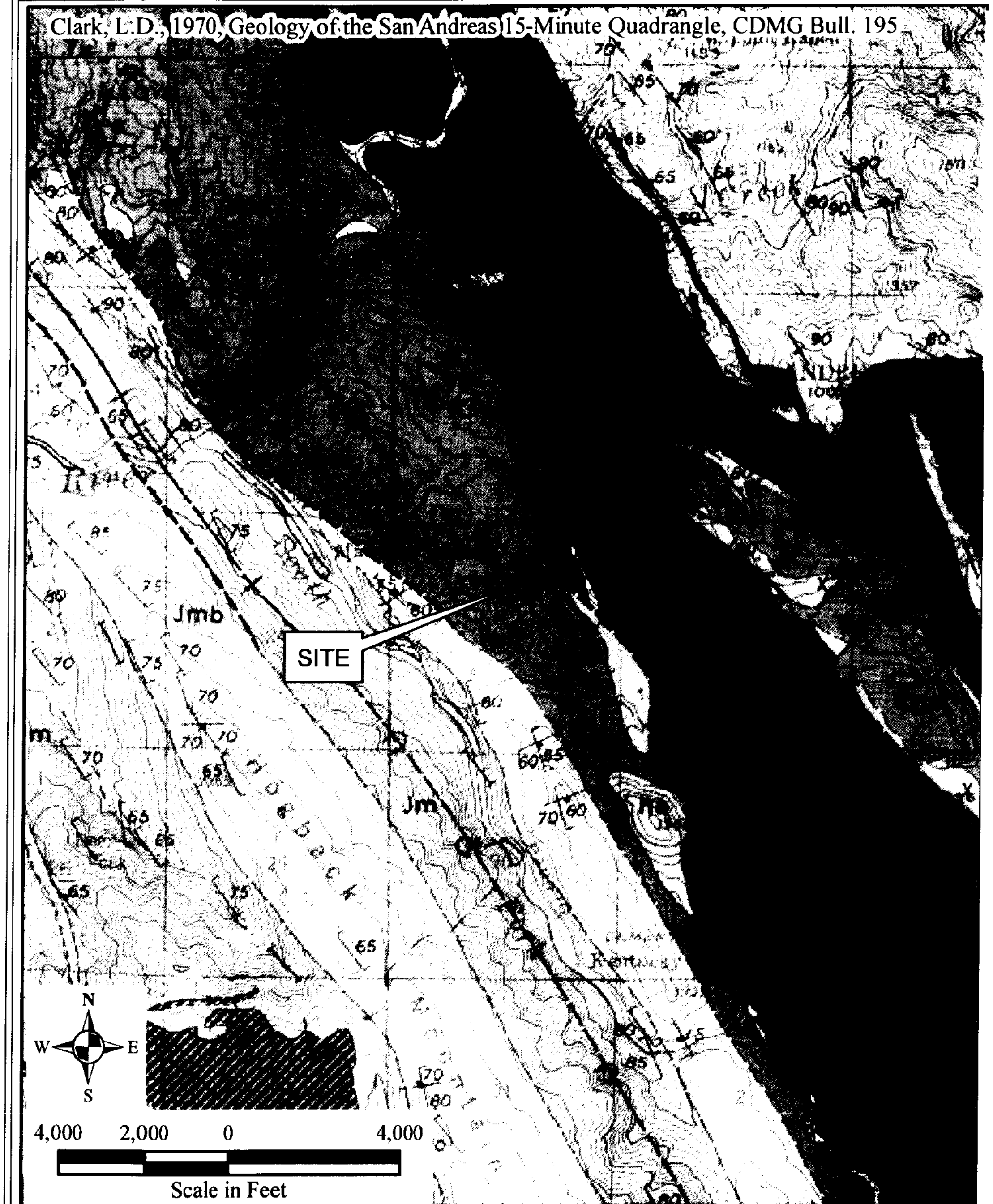
3 MAY 2006	
COMPILED	CHKD
ABD	ABD

LAND USE MAP
MOUNTAIN OAKS / MOUNTAIN RANCH SCHOOL RAW
CALAVERAS COUNTY OFFICE OF EDUCATION
1250 POOL STATION ROAD
SAN ANDREAS, CALIFORNIA

Figure 5

4660C_RAW_F5.MXD

Clark, L.D., 1970, Geology of the San Andreas 15-Minute Quadrangle, CDMG Bull. 195



Jm

Mariposa Formation

Sedimentary rocks of uncertain stratigraphic position

Mostly slate, possibly in part tuffaceous, with some interbedded tuff and graywacke. Lenticular petromict conglomerate abundant northwest of San Andreas and west of Bernasconi Ranch. Contains large slumped blocks of Paleozoic rocks in some places. Possibly in part equivalent to Mariposa Formation or Cosumnes Formation.

Jsc, *interbedded chert and slate*

Jsl, *massive white aphanitic limestone lenses*

Sedimentary rocks of uncertain stratigraphic position

Quartz-rich sedimentary and, possibly, volcanic rocks including graywacke or tuff, and phyllite with subordinate interbedded arkose and orthoquartzite. Resembles Shoo Fly Formation of northern Sierra Nevada. Northern block possibly includes other stratigraphic units.

Pzul, *recrystallized limestone and dolomitic limestone*

Felsic plutonic rocks

Igneous rocks variable in texture and composition, particularly near their margins, where they locally grade into more mafic rocks.

KJg, *granodioritic rocks.*

KJd, *dioritic rocks*

Ultramafic rocks

Mostly serpentine, but includes some dunite. Some bodies contain narrow chrysotile veinlets and pods or diffuse layers of chromite. Some serpentine is included with KJt *in northeastern part of quadrangle*

Hypabyssal intrusive rocks

Mafic porphyritic rock with saussuritized plagioclase phenocrysts in a black microcrystalline groundmass. Includes a body of pyroxene-bearing non-porphyritic rock east of Mt. Ararat

Copper Hill Volcanics

Mafic, intermediate, and sparse felsic volcanic rocks.

Jc, *tuff, lapilli tuff, and some volcanic breccia; southwestern part altered to schist containing fibrous amphibole, chlorite, and epidote; northwestern part chiefly bedded tuff and lapilli tuff.*

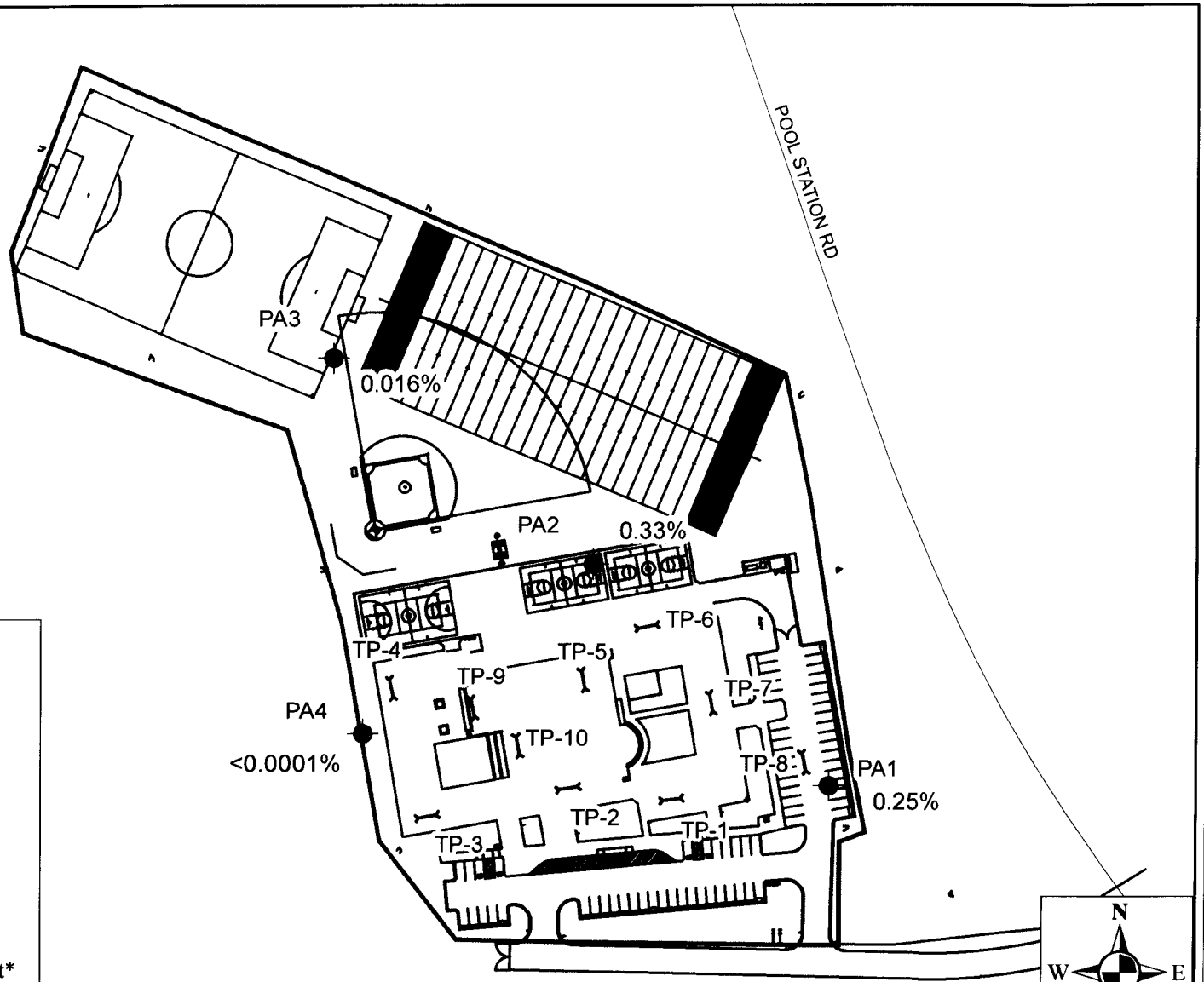
Jcb, *thick-bedded volcanic breccia.*

Jcl, *amygdaloidal mafic lava*

CONDOR EARTH TECHNOLOGIES, INC. 188 Frank West Circle, Ste I Stockton, CA 95206 (209) 234-0518 f(209) 234-0538 www.condorearth.com stockton@condorearth.com CONDOR	JOB # 4660C SCALE 1"= 4,000' DATE 3 MAY 2006 COMPILED AWA CHKD ABD	SITE GEOLOGY MOUNTAIN OAKS / MOUNTAIN RANCH SCHOOL RAW CALAVERAS COUNTY OFFICE OF EDUCATION 1250 POOL STATION ROAD SAN ANDREAS, CALIFORNIA

Figure 6

4660C_RAW_F6.MXD



LEGEND

TP-1 — Test Pit Location with ID

Analytical Results

- Sample Locations with asbestos greater than DTSC Action Level (0.001% by wt. TEM)
- Sample Locations with asbestos less than 0.0001% (by wt. TEM)
- School Site*
- Site Layout*

Data Sources:
* From California Design West Architects 9/2005
Aerial photograph from County of Calaveras GIS department (2002 flight)

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AWA	ABD

TEST PIT AND SAMPLE LOCATION MAP
MOUNTAIN OAKS/MOUNTAIN RANCH SCHOOL RAW
CALAVERAS COUNTY OFFICE OF EDUCATION
1250 POOL STATION ROAD
SAN ANDREAS, CALIFORNIA

Figure 7

4660B_RAW_F7.MXD

SCALE IN FE

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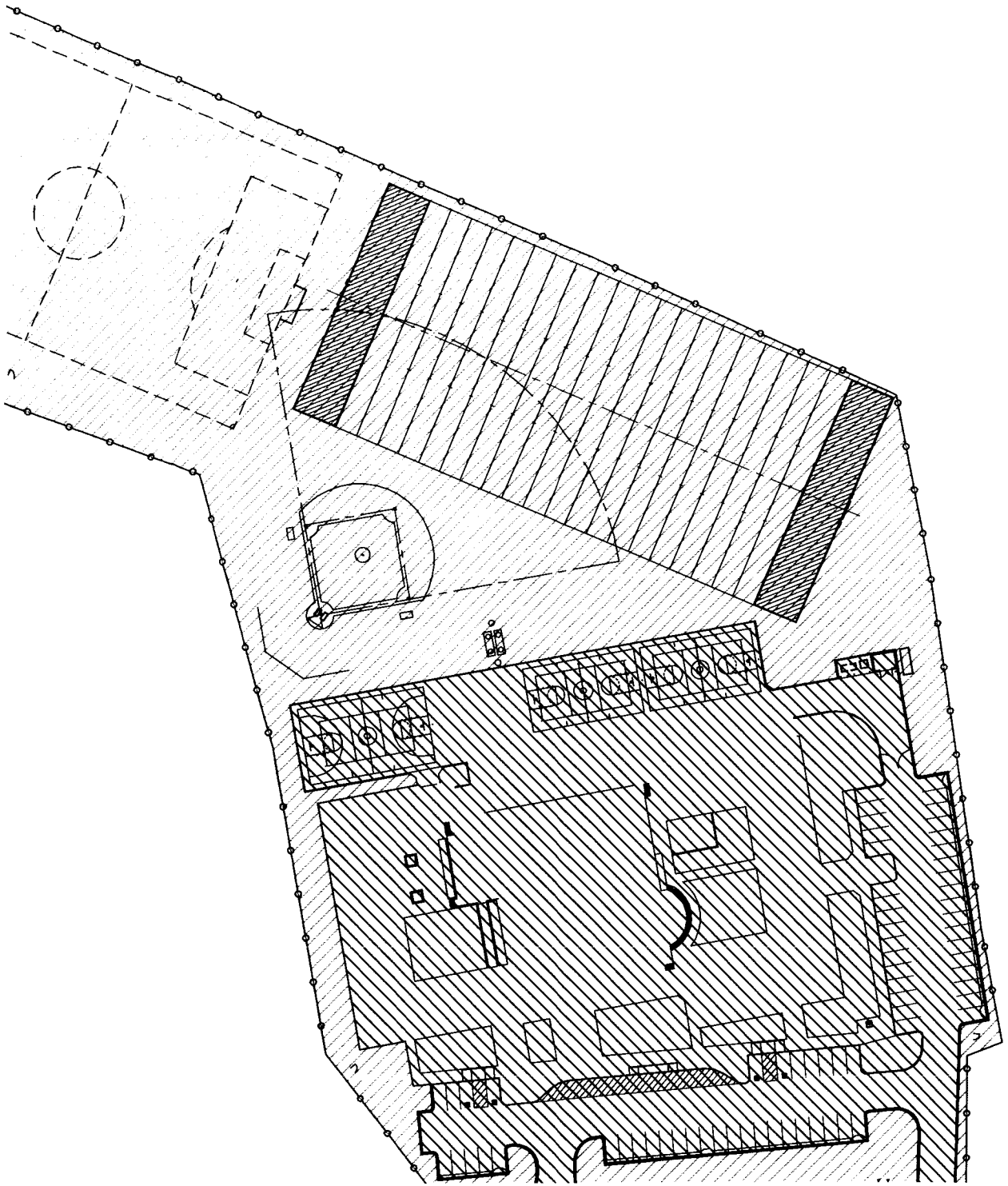

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Information Advisory
Clean Imported Fill Material

October 2001

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

It is DTSC's mission to restore, protect and enhance the environment, to ensure public health, environmental quality and economic vitality, by regulating hazardous waste, conducting and overseeing cleanups, and developing and promoting pollution prevention.

State of California

California Environmental Protection Agency

Executive Summary

This fact sheet has been prepared to ensure that inappropriate fill material is not introduced onto sensitive land use properties under the oversight of the DTSC or applicable regulatory authorities. Sensitive land use properties include those that contain facilities such as hospitals, homes, day care centers, and schools. This document only focuses on human health concerns and ecological issues are not addressed. It identifies those types of land use activities that may be appropriate when determining whether a site may be used as a fill material source area. It also provides guidelines for the appropriate types of analyses that should be performed relative to the former land use, and for the number of samples that should be collected and analyzed based on the estimated volume of fill material that will need to be used. The information provided in this fact sheet is not regulatory in nature, rather is to be used as a guide, and in most situations the final decision as to the acceptability of fill material for a sensitive land use property is made on a case-by-case basis by the appropriate regulatory agency.

Introduction

The use of imported fill material has recently come under scrutiny because of the instances where contaminated soil has been brought onto an otherwise clean site. However, there are currently no established standards in the statutes or regulations that address environmental requirements for imported fill material. Therefore, the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) has prepared this fact sheet to identify procedures that can be used to minimize the possibility of introducing contaminated soil onto a site that requires imported fill material. Such sites include those that are undergoing site remediation, corrective action, and closure activities overseen by DTSC or the appropriate regulatory agency. These procedures may also apply to construction projects that will result in sensitive land uses. The intent of this fact sheet is to protect people who live on or otherwise use a sensitive land use property. By using this fact sheet as a guide, the reader will minimize the chance of introducing fill material that may result in potential risk to human health or the environment at some future time.

Overview

Both natural and manmade fill materials are used for a variety of purposes. Fill material properties are commonly controlled to meet the necessary site specific engineering specifications. Because most sites requiring fill material are located in or near urban areas, the fill materials are often obtained from construction projects that generate an excess of soil, and from demolition debris (asphalt, broken concrete, etc.). However, materials from those types of sites may or may not be appropriate, depending on the proposed use of the fill, and the quality of the assessment and/or mitigation measures, if necessary. Therefore, unless material from construction projects can be demonstrated to be free of contamination and/or appropriate for the proposed use, the use of that material as fill should be avoided.

Selecting Fill Material

In general, the fill source area should be located in nonindustrial areas, and not from sites undergoing an environmental cleanup. Nonindustrial sites include those that were previously undeveloped, or used solely for residential or agricultural purposes. If the source is from an agricultural area, care should be taken to insure that the fill does not include former agricultural waste process byproducts such as manure or other decomposed organic material. Undesirable sources of fill material include industrial and/or commercial sites where hazardous ma-

Potential Contaminants Based on the Fill Source Area

Fill Source:	Target Compounds
Land near to an existing freeway	Lead (EPA methods 6010B or 7471A), PAHs (EPA method 8310)
Land near a mining area or rock quarry	Heavy Metals (EPA methods 6010B and 7471A), asbestos (polarized light microscopy), pH
Agricultural land	Pesticides (Organochlorine Pesticides: EPA method 8081A or 8080A; Organophosphorus Pesticides: EPA method 8141A; Chlorinated Herbicides: EPA method 8151A), heavy metals (EPA methods 6010B and 7471A)
Residential/acceptable commercial land	VOCs (EPA method 8021 or 8260B, as appropriate and combined with collection by EPA Method 5035), semi-VOCs (EPA method 8270C), TPH (modified EPA method 8015), PCBs (EPA method 8082 or 8080A), heavy metals including lead (EPA methods 6010B and 7471A), asbestos (OSHA Method ID-191)

**The recommended analyses should be performed in accordance with USEPA SW-846 methods (1996). Other possible analyses include Hexavalent Chromium: EPA method 7199*

Recommended Fill Material Sampling Schedule

Area of Individual Borrow Area	Sampling Requirements
2 acres or less	Minimum of 4 samples
2 to 4 acres	Minimum of 1 sample every 1/2 acre
4 to 10 acres	Minimum of 8 samples
Greater than 10 acres	Minimum of 8 locations with 4 subsamples per location

Volume of Borrow Area Stockpile	Samples per Volume
Up to 1,000 cubic yards	1 sample per 250 cubic yards
1,000 to 5,000 cubic yards	4 samples for first 1000 cubic yards +1 sample per each additional 500 cubic yards
Greater than 5,000 cubic yards	12 samples for first 5,000 cubic yards + 1 sample per each additional 1,000 cubic yards

terials were used, handled or stored as part of the business operations, or unpaved parking areas where petroleum hydrocarbons could have been spilled or leaked into the soil. Undesirable commercial sites include former gasoline service stations, retail strip malls that contained dry cleaners or photographic processing facilities, paint stores, auto repair and/or painting facilities. Undesirable industrial facilities include metal processing shops, manufacturing facilities, aerospace facilities, oil refineries, waste treatment plants, etc. Alternatives to using fill from construction sites include the use of fill material obtained from a commercial supplier of fill material or from soil pits in rural or suburban areas. However, care should be taken to ensure that those materials are also uncontaminated.

Documentation and Analysis

In order to minimize the potential of introducing contaminated fill material onto a site, it is necessary to verify through documentation that the fill source is appropriate and/or to have the fill material analyzed for potential contaminants based on the location and history of the source area. Fill documentation should include detailed information on the previous use of the land from where the fill is taken, whether an environmental site assessment was performed and its findings, and the results of any testing performed. It is recommended that any such documentation should be signed by an appropriately licensed (CA-registered) individual. If such documentation is not available or is inadequate, samples of the fill material should be chemically analyzed. Analysis of the fill material should be based on the source of the fill and knowledge of the prior land use.

Detectable amounts of compounds of concern within the fill material should be evaluated for risk in accordance with the DTSC Preliminary Endangerment Assessment (PEA) Guidance Manual. If

metal analyses are performed, only those metals (CAM 17 / Title 22) to which risk levels have been assigned need to be evaluated. At present, the DTSC is working to establish California Screening Levels (CSL) to determine whether some compounds of concern pose a risk. Until such time as these CSL values are established, DTSC recommends that the DTSC PEA Guidance Manual or an equivalent process be referenced. This guidance may include the Regional Water Quality Control Board's (RWQCB) guidelines for reuse of non-hazardous petroleum hydrocarbon contaminated soil as applied to Total Petroleum Hydrocarbons (TPH) only. The RWQCB guidelines should not be used for volatile organic compounds (VOCs) or semi-volatile organic compounds (SVOCS). In addition, a standard laboratory data package, including a summary of the QA/QC (Quality Assurance/Quality Control) sample results should also accompany all analytical reports.

When possible, representative samples should be collected at the borrow area while the potential fill material is still in place, and analyzed prior to removal from the borrow area. In addition to performing the appropriate analyses of the fill material, an appropriate number of samples should also be determined based on the approximate volume or area of soil to be used as fill material. The table above can be used as a guide to determine the number of samples needed to adequately characterize the fill material when sampled at the borrow site.

Alternative Sampling

A Phase I or PEA may be conducted prior to sampling to determine whether the borrow area may have been impacted by previous activities on the property. After the property has been evaluated, any sampling that may be required can be determined during a meeting with DTSC or appropriate regulatory agency. However, if it is not possible to analyze the fill material at the borrow area or determine that it is appropriate for use via a Phase I or PEA, it is recommended that one (1) sample per truckload be collected and analyzed for all compounds of concern to ensure that the imported soil is uncontaminated and acceptable. (See chart on Potential Contaminants Based on the Fill Source Area for appropriate analyses). This sampling frequency may be modified upon consultation with the DTSC or appropriate regulatory agency if all of the fill material is derived from a common borrow area. However, fill material that is not characterized at the borrow area will need to be stockpiled either on or off-site until the analyses have been completed. In addition, should contaminants exceeding acceptance criteria be identified in the stockpiled fill material, that material will be deemed unacceptable and new fill material will need to be obtained, sampled and analyzed. Therefore, the DTSC recommends that all sampling and analyses should be completed prior to delivery to the site to ensure the soil is free of contamination, and to eliminate unnecessary transportation charges for unacceptable fill material.

Composite sampling for fill material characterization may or may not be appropriate, depending on quality and homogeneity of source/borrow area, and compounds of concern. Compositing samples for volatile and semivolatile constituents is not acceptable. Composite sampling for heavy metals, pesticides, herbicides or PAH's from unanalyzed stockpiled soil is also unacceptable, unless it is stockpiled at the borrow area and originates from the same source area. In addition, if samples are composited, they should be from the same soil layer, and not from different soil layers.

When very large volumes of fill material are anticipated, or when larger areas are being considered as borrow areas, the DTSC recommends that a Phase I or PEA be conducted on the area to ensure that the borrow area has not been impacted by previous activities on the property. After the property has been evaluated, any sampling that may be required can be determined during a meeting with the DTSC.

For further information, call Richard Coffman, Ph.D., R.G., at (818) 551-2175.

Alan C. Lloyd, Ph.D.
Agency Secretary
Cal/EPA

Department of Toxic Substances Control

Maureen F. Gorsen, Director
1011 N. Grandview Avenue
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Arnold Schwarzenegger
Governor

February 14, 2006

Mr. John Brophy
Calaveras County Office of Education
185 S. Main Street
Angels Camp, California 95221

APPROVAL OF PRELIMINARY ENVIRONMENTAL ASSESSMENT, MOUNTAIN OAKS CHARTER SCHOOL AND MOUNTAIN RANCH COMMUNITY SCHOOL, 1250 POOL STATION ROAD, SAN ANDRES, CALAVERAS (SITE CODE: 104511)

Dear Mr. Brophy:

The Department of Toxic Substances Control (DTSC) received notice on February 13, 2006 indicating the Calaveras County Office of Education (CCOE) has complied with all public review and comment requirements for the Preliminary Environmental Assessment (PEA) pursuant to California Education Code (CEC), §17213.1(a)(6)(A). The CCOE made the PEA available for public review and comment from January 10, 2006 through February 10, 2006 and held a public hearing on January 30, 2006. No comments were received regarding the draft PEA.

The PEA report (Condor Earth Technologies, Inc., December 30, 2005) received January 9, 2006, presents data collected during a previous naturally occurring asbestos (NOA) investigation activity and recommends further action in the form of a Removal Action Workplan.

The CCOE is building a Charter School (K-12) and a Community School (6-12). The 7.74-acre site consists of former cattle grazing land. Since the land was only used for cattle grazing with no indication of buildings, the only contaminant of concern is NOA.

Based on the findings of the PEA report the presence of a naturally occurring hazardous material, which would pose a threat to public health or the environment under unrestricted land use, was indicated at the site. Therefore, DTSC concurs with the conclusion of the PEA that "Further Action" for the site is required and hereby approves the PEA as final.

Pursuant to CEC §17213.2 (a), if the CCOE elects to pursue site acquisition or construction, the CCOE shall enter into an agreement with DTSC to oversee response actions at the site. Please forward a written request to amend the existing Environmental Oversight Agreement (EOA) to a School Cleanup Agreement signed by an authorized CCOE representative, to:

Ms. Robbie Morris
Oversight Agreement Coordinator
School Property Evaluation and Cleanup Division
Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, California 90630-4732

The request should include the following information:

- Docket number for the existing EOA.
- School name and DTSC site code.
- Description of further action to be conducted (Removal Action)
- Chemicals of concern at the site.
- Date of the approved PEA.
- Date of DTSC determination for response action (date of this letter).
- Designation of the representative who will coordinate agreement activities with DTSC and will be the responsible signatory on the agreement.

Ms. Morris will prepare and forward an agreement for review and signature. Subsequently, the project manager will contact the CCOE to schedule a scoping meeting. For additional information regarding the response action process or amending an agreement, please contact Ms. Morris at (714) 484-5315 or rmorris@dtsc.ca.gov.

If you have any questions please contact Ms. Tami Trearse, Project Manager at (916) 255-3747 or me at (818) 551-2821.

Sincerely,

Sharon Fair, Chief
Glendale/Sacramento Branch
School Property Evaluation and Cleanup Division

cc: See next page

cc: Mr. Michael O'Neill
Consultant/Environmental Coordinator
School Facilities Planning Division
California Department of Education
1430 N Street, Suite 1201
Sacramento, California 95814

Mr. Alex Dewitt, P.G.
Condor Earth Technologies, Inc
188 Frank West Circle, Suite 1
Stockton, California 95206

Michelle Collins
School Site Solutions, Inc
3723 Kenwood Way
Roseville, California 95747

bcc: Ms. Tami Trearse, Project Manager
Schools Unit – Sacramento Office

Ms. Robbie Morris, EOA Coordinator
Schools Unit – Cypress Office

Dr. Brian Endlich, Toxicologist
HERD – Sacramento Office

Ms. Kim Rhodes, Public Participation Specialist
Public Participation Unit – Sacramento Office

SPECD Reading File – Sacramento Office

Terry Tamminen
Agency Secretary
Cal/EPA

Department of Toxic Substances Control

B.B. Blevins, Director
1011 N. Grandview Avenue
Glendale, California 91210

Arnold Schwarzenegger
Governor

INTERIM GUIDANCE
NATURALLY OCCURRING ASBESTOS (NOA)
AT SCHOOL SITES
Revised 9/24/04

This document is issued as an Interim Guidance subject to review and revision as necessary. This guidance does not supercede or implement laws or regulations governing asbestos containing materials. The information in this Interim Guidance is intended solely as guidance and as educational reference material and should not be considered enforceable or regulatory in nature.

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1.0 INTRODUCTION

This guidance supplements other currently available Department of Toxic Substances Control (DTSC) advisories for school projects by identifying strategies for environmental assessment, investigation, mitigation, and long-term maintenance at school sites where Naturally Occurring Asbestos (NOA) is a potential compound of concern. DTSC's intent is to prevent or reduce exposure to NOA, and thereby mitigate potential health risks. This guidance is being developed for use at California school sites and DTSC cautions against using the decision criteria contained in this document for other kinds of sites without first evaluating the site specific conditions and intended land use. This guidance uses conservative thresholds because children are typically more sensitive to exposures of hazardous substances including asbestos.

All asbestos minerals are hazardous to humans. Asbestos includes six regulated naturally occurring minerals, i.e., actinolite, amosite, anthophyllite, chrysotile, crocidolite, and tremolite. Asbestos is classified as a known human cancer-causing substance by local, state, and federal health agencies. In addition, asbestos is known to cause chronic respiratory diseases. Asbestos fibers may be released into the air as a result of activities which disturb NOA-containing rock or soils. Asbestos minerals can fragment into small fibers that readily suspend in air, and are of a size visible only under a microscope. Breathing these small fiber fragments may result in an increased risk of respiratory disease or cancer in exposed individuals.

To address potential asbestos concerns, the PEA should examine if NOA is present in the surface or subsurface soils or rock on the potential school site. At the PEA evaluation step, the potential school site is typically vacant and will need excavation, grading and other activities that alter the site topography in order to construct the school facility. DTSC believes that it is more cost effective and protective to determine if asbestos is present and take precautionary measures during construction to prevent future exposures from soils that contain asbestos, rather than first constructing the campus, assessing exposure, and then mitigating the site. Therefore, if asbestos is present above conservative thresholds described below, and the school district elects to proceed with developing the site for a school, plans will need to be developed that mitigate potential releases of asbestos in soil to students, staff and the surrounding community. These plans must be developed and approved by DTSC in a Remedial Action Workplan (RAW) described in Section 8.0 "Response Actions" in this guidance. The RAW should integrate school facility layout and design with asbestos measures to optimize facility placement with minimum NOA exposure.

2.0 REGULATORY AUTHORITY FOR DTSC OVERSIGHT OF SCHOOLS

NOA has recently been identified at several California school sites. Asbestos, including NOA, is classified as a hazardous substance under the Hazardous Substance Account Act, Chapter 6.8 of the California Health and Safety Code, and the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). A list of other applicable federal, state, and county laws and regulations pertaining to asbestos is included in Appendix A. Under these authorities, DTSC may require response actions be taken at existing or prospective school sites where NOA has been released to the environment, including air, water or soil.

Prior to acquisition and/or construction of prospective school sites, the Education Code (Sections 17210 et.seq., amended since January 2000) mandates that school districts

complete environmental assessments and cleanups in order to qualify for state funding. DTSC's role is to evaluate these assessments and cleanups, to ensure that they are performed in compliance with state statutes and regulations, and in accordance with recognized standards. If prospective school sites are determined to have environmental contamination from hazardous materials, such as NOA, where there may be unacceptable health risks, they must be properly mitigated or remediated prior to occupancy for protection of human health and the environment.

This guidance does not address compliance with the Asbestos Hazard Emergency Response Act (AHERA), which was enacted in 1986 to ensure that school districts safely managed asbestos-containing-materials found in schools.

3.0 GEOLOGIC OCCURRENCE OF ASBESTOS IN CALIFORNIA

Six regulated asbestos minerals belong to two different mineral groups. Chrysotile belongs to the serpentine mineral group and the remaining asbestos minerals (actinolite, amosite, anthophyllite, crocidolite, and tremolite) belong to the amphibole mineral group. In California, the asbestos minerals are most commonly associated with ultramafic rocks and their metamorphic derivatives, including serpentinite (serpentine rock). Ultramafic rocks are those igneous rocks composed mainly of iron-magnesium silicate minerals that crystallize deep in the earth's interior. By the time they are exposed at the earth's surface, ultramafic rocks have typically undergone metamorphism, a process in which the mineralogy of the rock is changed in response to changing chemical and physical conditions. One of the commonly occurring types of metamorphism in ultramafic rocks is known as serpentinization, a process that alters the original iron-magnesium silicate minerals in ultramafic rocks to one or more water-bearing magnesium silicate minerals belonging to the serpentine mineral group and producing a rock called serpentinite. One of the asbestos minerals, chrysotile, is often present in the resulting rock. Less commonly, chrysotile may also occur in contact metamorphic rocks associated with carbonate rocks such as limestone and dolomite. Metamorphic processes may also lead to the formation of amphibole asbestos minerals in ultramafic rocks.

In California, amphibole asbestos most commonly occurs within the margins of, or immediately adjacent to, serpentinite or ultramafic rock bodies, but is less common than chrysotile asbestos. Tremolite-asbestos and actinolite-asbestos are the most common types of amphibole-asbestos in the State. They generally occur in veins associated with fault or shear zones in ultramafic rocks and serpentinite. In addition to association with ultramafic rock and serpentinite, amphibole asbestos minerals are also known to occur in association with some faults in particular geologic settings, certain non-ultramafic rock types such as schists, gabbroic rocks (in special cases), albitites, and contact metamorphic rocks associated with carbonate rocks such as limestone and dolomite. These amphibole asbestos occurrences are much less common than the ultramafic rock/serpentinite associations. Also, more recently, amphibole asbestos minerals have been found in metamorphosed volcanic rocks (e.g., Copper Hill and Gopher Ridge units) near hydrothermal and shear zones. These units have comparable units to the north and south along the Western Metamorphic Belt of the Sierra Nevada Mountains.

In addition to being associated with specific rock types, NOA may be more commonly found in or around certain geologic features such as faults or shear zones, near geologic contacts, or in or near zones of hydrothermal alteration. The asbestos minerals may be present in soils or alluvium derived from asbestos containing parent materials. Soils

developed on NOA containing rocks may be transported away from the original outcrop by the actions of water, wind, and gravity. Alluvium containing NOA may be transported many miles by the action of streams or rivers and deposited in areas far removed from the original source.

The maps of the Geologic Atlas of California and Regional Geologic Map Series published by the California Geologic Survey (formerly Division of Mines and Geology) provide general locations of ultramafic rock and serpentinite around the State. These maps may be referenced to indicate the likelihood of NOA occurrence at a proposed or existing school site. However, because of their small scale, these geologic maps may not show small occurrences of ultramafic rock or serpentinite. A list of these geologic maps is included in Appendix B.

4.0 HEALTH EFFECTS OF ASBESTOS

Health effects of asbestos are dependent primarily upon human exposure to airborne asbestos fibers. Asbestos fibers are odorless. They do not dissolve in water, and are resistant to heat, fire, chemical and biological degradation. Asbestos fibers are very small, and can be easily suspended in air and dispersed by wind or water. Risks to human health are primarily associated with inhaling asbestos fibers, which can become airborne as a result of activities that disturb rock or soil that contains asbestos.

Asbestos fibers can be inhaled deep into the lungs, where they may be retained indefinitely. Asbestos fibers can cause health effects, including respiratory disease (asbestosis), lung cancer, and mesothelioma. Mesothelioma is a rare cancer caused almost exclusively by exposure to asbestos. In addition, asbestos and tobacco smoke have a strong interactive synergism which can produce even higher incidences of lung cancer. The longer a person is exposed to asbestos and the greater the intensity of exposure, the greater the chances for a health problem. Some forms of cancer may take as many as forty years to develop; however, there is concern that even short term exposures may have significant health impacts. All forms of asbestos are considered hazardous.

Exposures to airborne asbestos fibers generated from disturbing soils have been difficult to model and quantify. Therefore, it is difficult to predict airborne asbestos fiber concentrations from the concentration of asbestos fibers in rock or soil. Because of this, a quantitative human health risk assessment with corresponding cancer risk values can not be calculated based solely on concentration of asbestos in soil. DTSC has reviewed existing empirical exposure data in experimental situations and to qualitatively assess the potential for risk. This has lead to development of a strategy to prevent or reduce potential exposures to NOA by instituting mitigative measures based on the presence of NOA in soil or rock at proposed school facilities. The intent of these measures is to either eliminate or greatly reduce possible airborne entrainment of the asbestos fibers from NOA in the rock or soil. These proposed mitigative measures are discussed in Section 8.

5.0 DTSC's FOUR STEP PROCESS

The ***NOA Decision Flowchart for School Sites*** (Figure 1) has been developed to assist school districts and their consultants in conducting environmental assessments, investigations, and response actions (if needed) at new or expanding school sites with potential NOA. The four-step process includes identification, investigation, mitigation, and monitoring. This process should be followed for new or expanding school sites; Steps 1 through 3 ordinarily will be completed prior to commencement of construction activities to build a new school. Step 4 will be included as necessary on a site-by-site basis. These Steps are described in detail in Sections 6 - 9.

- **Step 1, Identification (Phase I Environmental Site Assessment)**: In the top third of the Flowchart, boxes show information needed through record searches and site inspection during the Phase I Environmental Site Assessment (Phase I). Unless DTSC approves a No Action determination, decision points note where the school district may elect to drop a site or may proceed with further investigation if potential NOA is identified.

- **Step 2, Investigation (Preliminary Environmental Assessment)**: If NOA is potentially identified at the site, and the school district elects to continue, environmental sampling and analysis will be needed in the Preliminary Environmental Assessment (PEA), shown in the center section of the Flowchart. If NOA is positively identified at the school site, the school district must decide whether or not to proceed with site acquisition, since mitigation may be required.

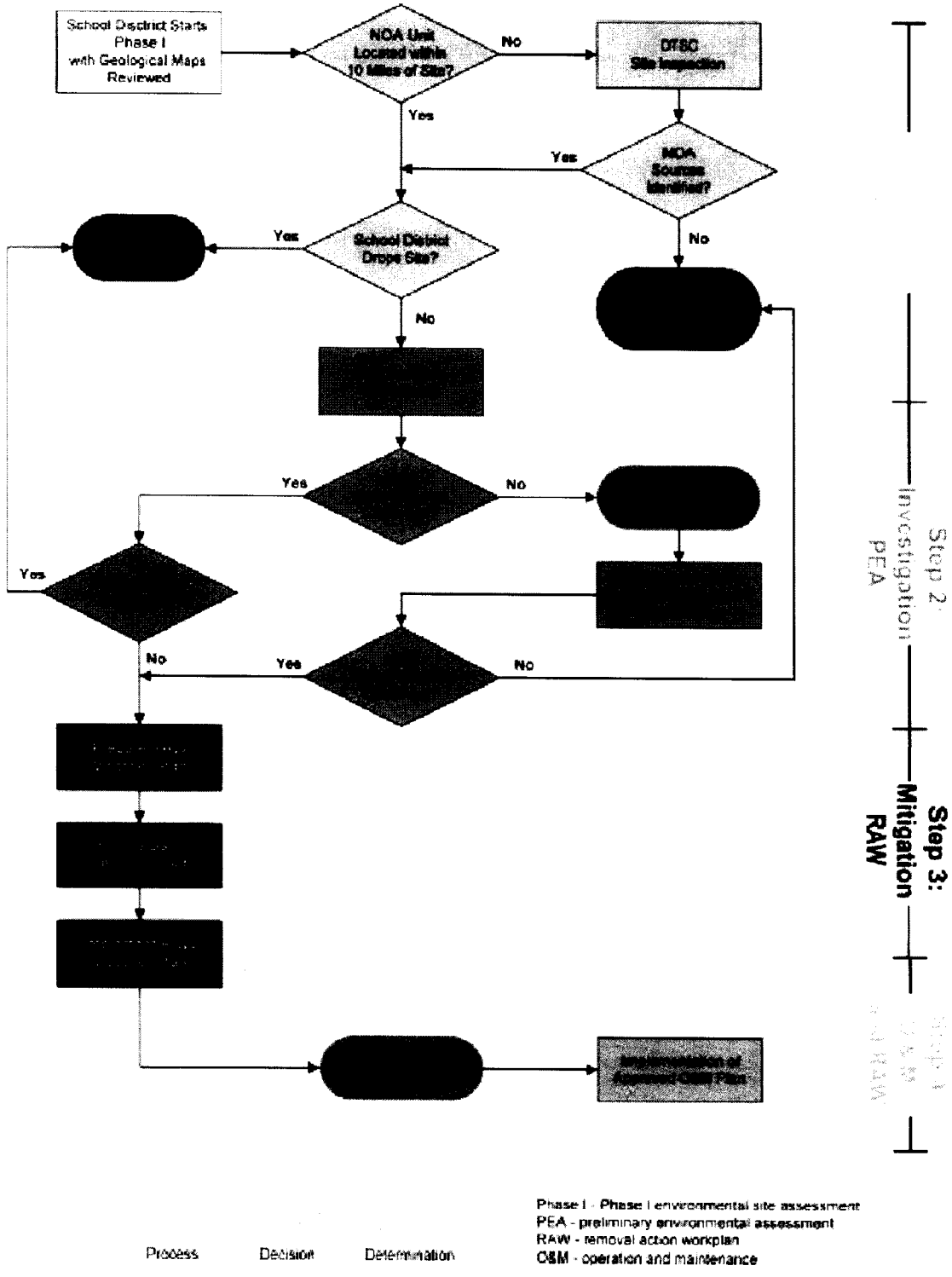
  Note: Even if Conditional No Further Action is approved, DTSC recommends that districts have a qualified professional (e.g., Registered Geologist) onsite so that geologic units that could potentially contain NOA may be identified during excavation, grading and/or construction activities that disturb the soil or rock. Such findings may necessitate re-opening of the environmental assessment process. Where NOA is later identified during excavation or school construction, school districts are required by statute to immediately stop work and notify DTSC. DTSC will evaluate site conditions before giving approval for site activities to continue.

- **Step 3, Mitigation (Response Action)**: As shown in the lower third of the Flowchart, DTSC may require a response action be taken, depending upon the concentration of NOA in soils. The response action will include preparation of a Removal Action Workplan (RAW) or Remedial Action Plan (RAP) to mitigate potential health risks by preventing or reducing exposure to NOA. The probable response action may include bringing in clean fill or other barriers to mitigate potential NOA exposures. Portions of the mitigation implementation may occur during the construction process.

- **Step 4, Long Term Operation and Maintenance (O&M)**: Prior to implementation of the response action, DTSC may require the school district enter into enforceable Agreement to provide ongoing operation and maintenance to ensure that the remedy selected for the response action will remain protective in perpetuity. Following approval of the Operation and Maintenance Plan and completion of the response action, DTSC will issue certification for the school site.

Figure 1

NATURALLY OCCURRING ASBESTOS (NOA) DECISION FLOWCHART FOR SCHOOL SITES



6.0 STEP 1 – IDENTIFICATION – PHASE I ENVIRONMENTAL SITE ASSESSMENT

Note: While this guidance focuses on the identification of NOA at school sites, the possible presence of other chemicals or compounds of concern may also need to be assessed, depending on individual site history and environmental indicators.

6.1 Phase I Environmental Site Assessment

The environmental assessment of a proposed school site begins with a Phase I Environmental Site Assessment (Phase I). According to the Education Code and California Code of Regulations, Title 22, sections 69100-69104, the Phase I shall be conducted by a qualified professional, in accordance with the American Society for Testing and Materials (ASTM) *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, (ASTM Designation E 1527 and E 1528),* Please see DTSC's *Phase I Environmental Site Assessment Advisory: School Property Evaluation*, issued September 5, 2001, available on DTSC's website at www.dtsc.ca.gov.

Note: Where the presence of NOA is strongly suspected, a school district may proceed directly with a Preliminary Environmental Assessment of the site, incorporating Phase I information.

6.2 File Review

In accordance with the requirements listed above, the purpose of the Phase I is to review all available site information (e.g., records, files and maps) to determine if there is a Recognized Environmental Condition, such as NOA, at the site. Examples of sources of information include but are not limited to maps such as the statewide asbestos map, and mineral sheets, file reports such as the USGS & CGS open file reports, and other studies. Appendix B lists several sources of information on the occurrence of NOA. The Phase I Report should include findings and supporting documentation, and reach a recommendation as to the need for Further Action or No Action. The Phase I Report prepared by the school district's consultant should be submitted to DTSC for review and approval, and should include a site inspection report.

6.3 Site Inspections

It is not always possible to determine the presence of a geologic unit of concern at a site simply from review of the geologic maps for the site. A site inspection should be conducted to observe the site for possible presence of NOA if the Phase I recommendation will be No Action.

In accordance with the Business and Professions Code, Chapters 7 and 12.5, and the California Code of Regulations, Title 16, Chapters 5 and 29, a site inspection should be conducted by a California registered professional. The California registered professional should be appropriately trained and experienced in the identification of NOA. DTSC recommends that geologists use the California Geologic Survey's Special Publication # 124: "Guidelines for Geologic Investigations of Naturally Occurring Asbestos in California" as reference for inspecting potential NOA sites.

DTSC's project manager and geologist will conduct a site inspection during the Phase I review. School districts and their consultants may accompany DTSC staff on this inspection.

NOA may occur in association with various geologic units, such as ultramafic and mafic rock and serpentinite, soils associated with these geologic units, or other geologic features such as faults, geologic contacts, or alteration zones. NOA may also be associated with fill or roadbase materials that have been imported onto the site. NOA can also be transported from off-site sources onto the site by geologic processes, such as erosion or alluvial transport. Care should be taken in the field to look for geologic units that could potentially contain NOA, such as ultramafic or mafic rock or serpentinite, and soils derived from these units. Indicators of geologic features should also be evaluated, such as fault or shear zones (scarps, overly steep slopes, disrupted drainage, etc.), geologic contacts (lithology changes, vegetation changes), alteration zones (mineralization, bleaching), or other features that may indicate potential NOA.

6.4 Determination

Based on the Phase I Report and site inspection findings, DTSC's project team and management will make a determination as to whether or not Further Action is needed for prospective school sites.

Note: At sites with possible NOA, where DTSC does not require Further Action, DTSC recommends that school districts employ a qualified professional (e.g., registered geologist) to be present during grading, excavation, construction and other earth-moving activities. Where NOA is later identified during building excavation or school construction, school districts are required by statute to immediately stop work and notify DTSC; DTSC will evaluate site conditions before giving approval for site activities to continue.

6.4.1 Further Action Determination

Further Action (i.e., completion of a Preliminary Environmental Assessment, as described in Section 7) should be recommended in the Phase I report if NOA is potentially present under any of the following conditions:

- When geologic units or features are present that could potentially contain NOA;
- When areas are identified that could have received NOA from erosion, run-off or other forces that could move soil or rock containing asbestos away from geologic units containing NOA;
- When fill soils or surfacing materials potentially containing NOA have been brought onto the site;
- When the site is located within a 10-mile radius or in a down-slope drainage area of a NOA geologic formation that could potentially contain NOA.

6.4.2 No Action Determination

A No Action Determination for NOA should be recommended if all of the following conditions are met:

- When geologic units or features that potentially contained NOA are not located within a 10-mile radius of the site;
- When no other potentially NOA related geologic features, such as geologic contacts, fault or shear zones, alteration zones, metamorphic contacts, mélanges, or alluvial deposits are identified at the site;
- When no fill soils or surfacing materials potentially containing NOA have been brought onto the site.

7.0 STEP 2 – INVESTIGATIONS – PRELIMINARY ENVIRONMENTAL ASSESSMENT

7.1 Preliminary Environmental Assessment

The Preliminary Environmental Assessment (PEA) provides basic information for determining if there has been or if there could be a release of a hazardous substance or hazardous material that presents a potential risk to human health or the environment. The PEA investigation requires collection and review of background information and chemical data to complete a screening level evaluation of the site. As required by the Education Code, the PEA should be conducted in accordance with DTSC's *Preliminary Endangerment Assessment Guidance Manual, Second Printing in June 1999*. However, as discussed in Sections 4.0 and 7.8, a Human Health Risk Assessment statistical model will not be utilized for schools with geologic units that could potentially contain NOA.

If a school district chooses to proceed with a project for which DTSC has issued a Phase I Determination requiring Further Action, DTSC will request that the school district enter into an Environmental Oversight Agreement with DTSC. This also applies to school districts which elect to bypass the Phase I and directly initiate a PEA. This agreement authorizes DTSC to oversee the PEA process, and to recover oversight costs.

Prior to commencing the required PEA field activities, the consultant for the school district should prepare a PEA workplan for DTSC review and approval. However, before the PEA workplan is submitted to DTSC for review, DTSC recommends that the school district representatives and their consultant participate in a scoping meeting to discuss the scope of work, sampling and analytical strategy for the required PEA. The school district and their consultant should gather all relevant information and prepare a conceptual strategy to share with DTSC's project team. For the investigation, DTSC's project team will likely include a project manager, unit supervisor, geologist, and toxicologist.

7.2 Preparation by Qualified Professional

School districts will need to employ a qualified and experienced professional environmental consultant to conduct the PEA, as required by Education Code Section 17210(b). For specific requirements, see DTSC Fact Sheets # 2 and 3,

dated February 2001 and November 2001, respectively, available on DTSC's website at www.dtsc.ca.gov.

7.3 Sampling Strategy for Naturally Occurring Asbestos

The first task in the PEA is the characterization of the soil to determine if NOA is present at the school site. In order to accomplish this task expeditiously, a PEA Workplan should be prepared by the school district's consultant. Prior to preparing the workplan, sampling strategy proposals should be discussed before implementation with DTSC's project team to reduce the need for remobilization and repeated sampling.

7.3.1 Soil Sampling Considerations

Because NOA may be found in identifiable geologic units and features (such as faults and outcroppings) as well as in imported fill or present in soil, different sampling strategies may be employed depending on site conditions. NOA may be present across the site in soils, or it may be confined to a relatively small area of the site, such as NOA veins within a rock outcropping. NOA may not always be immediately visible; therefore, trenching, test pits, and borings are effective methods to assess the presence of NOA in the surface and subsurface soils at a school site. DTSC recommends the following approach:

- Samples should be collected from areas that are suspected of having the highest NOA concentrations;
- If soil or aggregate is sampled and pieces appear to contain asbestos, then those pieces should be selected for analysis;
- Soil should be tested even if there is no visible source of NOA;
- Each identified geologic unit should be sampled at the interface between different units. At least two samples of each rock type should be sampled and analyzed for NOA;
- If imported fill or surfacing materials are present which could potentially contain NOA, such as serpentine aggregate, the sampling strategy should include consideration of the volume and placement of the fill material. Please see DTSC's *Information Advisory—Clean Imported Fill Material, October 2001*, available on DTSC's website at www.dtsc.ca.gov, for an overview of sampling protocols for imported fill materials.

7.3.2 Proposed and Expansion School Sites: Sampling Protocol

Because many proposed school sites can extend over many acres, both a focused sampling strategy and a strategy for likely homogenous soil areas should be used. The PEA Workplan should include a description of the proposed number and location of proposed soil matrix samples. The actual number of samples and depths may be modified in the field, based on criteria defined in the PEA Workplan and approval from DTSC team's project manager or geologist.

7.3.2.1 Focused Sampling

For sites where there are identifiable geologic units or features, such as outcroppings and faults, focused sampling should be conducted. Areas where focused sampling should occur are listed above in Section 7.3.1. The actual number and locations of samples from these areas must be based on the site inspection and in consultation with the DTSC geologist and project manager.

7.3.2.2 Homogeneous Soil Areas

As determined in consultation with DTSC's geologist, DTSC recommends that a statistical approach to generalized sampling be used for school sites or areas of the school sites which appear to be relatively homogeneous with respect to topography, lithology, or soil unit. This approach may include the following strategies:

- A minimum of one trench should be excavated for every two acres;
- Trenches should be a minimum of 10 linear feet in length;
- For each location, two sample depths should be collected; i.e., at surface and at a depth of 1 foot below the deepest point of any potential excavation (e.g., the lowest proposed construction base, utility trench base, etc.);
- Each identified soil or rock type should be sampled at the interface between different soil or rock types. At least two samples of each mineral type should be sampled and analyzed for NOA;
- Deeper samples may be archived, to be analyzed selectively, in consultation with DTSC's project manager, if NOA is not detected in surface samples.

7.3.3 Existing School Sites: Sampling Protocol

Existing schools, which are not undergoing expansions, are not subject to the requirements of DTSC oversight per the Education Code. However, some school districts have requested DTSC's assistance in investigating current site conditions at existing schools. Sampling strategies for existing school sites should be developed specifically for the current school conditions.

The sampling strategy should address the following:

- Considerations described in Section 7.3.1, as well as site-specific conditions including exposed soil, play fields, unpaved walkways, and dirt/gravel roads and parking areas;
- Areas where soil could be disturbed, potentially producing airborne asbestos fibers should be assessed;
- Consideration of use of activity pattern sampling in exposed areas, to include disturbance of the soil and air monitoring for asbestos fibers. Activity pattern sampling may be a cost-effective sampling approach in some situations, especially at existing school sites.

7.4 Geologic Log

Geologic logging should be performed or supervised by a California registered environmental professional, in accordance with professional licensing requirements for geologists and engineers, at each trenching or boring location. See also Section 6.3.

7.5 Analytical Methods for Soil and Bulk Samples

Analytical laboratories should be certified by the National Voluntary Laboratory Accreditation Program (NVLAP) and have passed a USEPA audit for environmental asbestos analysis.

Laboratory analyses of collected asbestos soil samples should be performed by either the CARB Method 435 using Polarized Light Microscopy (PLM), or United States Environmental Protection Agency's (USEPA) Bulk Method using Transmission Electron Microscopy (TEM) as described in EPA/600/R-93/116. Both methods can speciate NOA, identifying specific minerals.

Note: Results from the two methods are not directly comparable, because PLM results are reported as number of asbestos structures, and TEM results are reported as percentage of asbestos by weight.

7.5.1 Polarized Light Microscopy (PLM)

PLM uses an optical microscope equipped with two polarizing filters to observe specific optical characteristics of a sample, including particle morphology and color. PLM can identify both serpentine and amphibole asbestos, although very thin fibers of amphibole may be missed. The CARB 435 method requires that results be reported as the number of asbestos particles identified among 400 total particles. Count sheets should identify those particles counted as asbestos by: a) specific type of asbestos; and b) the number that are less than 5 microns and those greater than 5 microns in length. Specific sample preparation and analysis procedures are described in the *California Air Resources Board Method 435 Determination of Asbestos Content of Serpentine Aggregate.*

7.5.2 Transmission Electron Microscopy (TEM)

In comparison with the PLM method, the TEM method allows for greater resolution of particles, including detection and identification of smaller diameter particles, which is important when identifying amphibole asbestos. TEM is considered by many to be the most effective way of determining the presence of asbestos. TEM works by passing electrons through a very thin sample onto a detector, which then displays the image onto a monitor. Quantitative analysis methods for the determination of asbestos content using TEM have been difficult to develop; however, it is widely held that US EPA Method 600/R-93/116, Section 2.5 (quantitative) is currently the best method available for TEM analysis. This method involves the preparation of soil samples through separating asbestos fibers from the surrounding matrix. Aspect ratios are counted to show the ratio of fiber length to width. Sufficient grids should be counted to achieve a sensitivity of 0.0005% by weight.

7.5.3 Sample Preparation

California Air Resources Board (CARB) Method 435 should be used to prepare soil samples for TEM analysis. TEM analysis at school sites should incorporate US-Asbestos Hazard Emergency Response Act (AHERA) counting rules.

Sample preparation methods should be clearly described in the PEA Workplan. The Workplan should describe the kinds of equipment that the laboratory will use, and the specific steps they will employ in preparing the samples, including the filters to be counted by either PLM or TEM methods.

Note: The USEPA bulk method was originally designed for building materials, and includes preparation processes to minimize interference from glues and organic fibers often found in these products. These preparation processes, including acid digestion and ashing, should not be used for environmental samples, such as soil matrix and soil aggregate samples.

7.5.4 Data Quality

In order to assure reliable data is generated, Quality Assurance/Quality Control measures should be incorporated into the PEA Workplan and subsequent PEA Report. Because of the difficulty of preparing surrogate and spiked reference samples, duplicate sample analysis is an important tool to evaluate analysis precision. Data validation procedures should also be clearly described in the PEA Workplan and PEA Report.

Inter-laboratory and intra-laboratory analyses are recommended in order to monitor systematic errors that may develop among microscopists using the TEM method. These analyses should be designed to test both the overall method and the performance of individual microscopists. Repeating preparation of TEM grids from different sectors of a filter, followed by examination of the grids by a different microscopist is a test for the reproducibility of the whole method. However, non-uniformity of the particulate deposit on the filter may lead to differences which are not related to the performance of the microscopists. Verified fiber counting by two or more operators counting asbestos structures on the same grid penings of a TEM grid followed by resolution of any discrepancies may be used to address these differences.[1]

7.5.5 Analysis Strategy

DTSC recommends that the following steps should be taken to analyze soil and bulk samples collected from the potential school site:

- Analysis procedures should count all asbestos particles with the aspect ratio of 3:1, including those particles less than 5 microns in length;

[1] ISO 10312: 1995 Section 10.3.3

- After analysis, all soil and aggregate samples, the PLM slides and TEM filters should be archived until completion of the project, in case they are needed for data validation or if questions arise about the data results;
- All of the samples collected should be analyzed by PLM methodology, such as CARB 435, to screen a proposed school site;
- TEM analysis should be conducted at the discretion of DTSC's project management team; if sample results are non-detect or trace (below reportable detection limits) by the PLM method, 10% to 25 % of the samples should be selected and re-analyzed using the TEM method with a sensitivity of 0.0005% by weight.

7.5.6 Reporting Results

The PEA report should include the following information for NOA analyses:

- Description of any deviation from sample collection, preparation and analysis procedures described in the PEA workplan;
- Description of data validation results, including quality assurance and quality control results;
- Sample results shown on a summary table listing PLM results (percent by structures), TEM results (percent by weight) of asbestos fibers, and identification of the asbestos mineral species found in each sample;
- Count sheets for each analysis, specifying the number/dimensions of structures counted that are less than 5 microns, and those that are greater than 5 microns.

7.6 Preliminary Environmental Assessment Report

The PEA Report should be prepared by the school district's consultant to summarize fieldwork, findings and conclusions. The draft report should be submitted to DTSC for review and approval, in accordance with procedures specified in Education Code section 17213.1(a)(6). The PEA Report should also include maps illustrating surface features, sampling locations, laboratory results, and should specify locations of any areas where geologic units potentially containing NOA were visually identified at the site. The site figure should be properly scaled, and should include a north directional arrow and locations of site access roads.

Because the PEA Report requires a geologic evaluation and conclusions, the PEA Report should be stamped (required for professional engineers), signed, and dated (required for both registered geologists and engineers), and should specify the license number and expiration date of the California-registered professional who prepared the documents.

7.7 Risk Management Approach for School Sites with NOA

As discussed in Section 4.0, due to the difficulty in modeling and predicting health risks that may result from inhalation of airborne asbestos generated by disturbance of NOA containing rock or soil, a screening Health Risk Assessment will not be utilized for school sites where NOA has been identified. Instead,

mitigative measures will be required where NOA is identified in order to prevent or reduce potential exposures to NOA.

For school sites where NOA has been identified, DTSC may require Further Action (mitigation), depending on concentrations of NOA identified in soil and geologic units. This decision will be based upon sampling results from either PLM or TEM analytical methods, as specified in Sections 7.7.1 and 7.7.2.

Note: Results from the two methods are not directly comparable, because PLM results are reported as number of asbestos structures, and TEM results are reported as percentage of asbestos by weight.

7.7.1 PLM-Based Criteria

The CARB 435 PLM method, with a detection limit of 0.25% or less, may be used to screen a proposed school site. If NOA is detected at greater than or equal to 0.25 % (PLM), DTSC may require further action at school sites. Once this determination is made, school districts have the option of dropping the NOA sites, or working with DTSC to complete mitigation of NOA exposures during and after school construction.

7.7.2 TEM-Based Criteria

If NOA is detected at concentrations greater than or equal to 0.001% by weight (TEM), DTSC may require further action at school sites, depending upon the frequency and location of soil samples exceeding this concentration.

7.8 Preliminary Environmental Assessment Determination

7.8.1 No Further Action Determination

DTSC will issue a "Conditional" No Further Action determination letter to the school district if NOA is not detected at a level of 0.001% by weight (TEM) at the school site.

However, due to the uncertainty and difficulty in identifying geologic units that could potentially contain NOA, DTSC recommends a California registered professional observe future grading, and excavation or other activities that disturb the soil during school construction to ensure that potential NOA will be identified if present.

In addition, even for sites where DTSC has issued a No Further Action determination, DTSC recommends that school districts contact their local Air Pollution Control District or Air Quality Management District to determine whether or not the CARB *Air Toxic Control Measure (ATCM) Section 93105 for Construction, Grading, Quarrying, and Surface Mining Operations* will be applicable during earth-moving activities for school sites located within geologic areas that could potentially contain NOA.

7.8.2 Further Action Determination

If the PEA Report identifies detection of NOA at a level equal to or exceeding 0.25% (PLM) or 0.001% by weight (TEM), DTSC may issue a Further Action determination letter to the school district, requiring that a

response action be conducted to mitigate against possible future exposures to NOA. Some studies assessing air concentrations resulting from disturbing soils containing 0.001 % by weight (TEM) have shown elevated air concentrations of asbestos. [2] As a result, DTSC believes this concentration is an appropriate interim threshold for determining if further action or assessment is needed at a potential school site. This level may be modified in the future as more data is collected from activity/exposure studies and attendant soil concentrations.

8.0 STEP 3 – MITIGATION – RESPONSE ACTIONS

In accordance with the Education Code and the Health and Safety Code, response actions must be taken to abate or mitigate threats to human health and the environment. If a PEA identifies NOA above acceptable concentrations (as identified above in Sections 7.7 and 7.8.2) at a prospective school site, the school district may elect to drop the school project at such sites, or may proceed with the required response action.

8.1 Response Actions - Removal Action Workplan

A Removal Action Workplan (RAW), as defined by Section 25323.1 of the Health and Safety Code, is a remedy selection document required to carry out an effective removal or mitigation action that protects public health and safety, and the environment. The consultant for the school district should prepare and submit the draft RAW for DTSC's review and approval prior to implementation of any response actions.

Please see DTSC's *Schools Fact Sheet # 4, Removal Action Workplan,* revised June 2003, available on DTSC's website at http://www.DTSC.ca.gov for more information concerning the response action process. Additionally, DTSC has prepared several sample RAWs, and will provide consultation to school districts and their consultants to assist in preparation of RAWs for specific sites. DTSC will request that the school district enter into a Voluntary Cleanup Agreement (VCA) with DTSC, to allow DTSC to oversee the required removal action at the site, and to recover oversight costs. DTSC's project team may include: project manager, unit supervisor, geologist, engineer, toxicologist, public participation specialist, and industrial hygienist.

For school sites with NOA above acceptable concentrations, the RAW may generally require grading, backfill, and final surface finish (e.g. paving or clean fill) to protect students, faculty and staff from potential exposure. The RAW should also specify all measures needed to mitigate NOA releases during and after any grading, excavation, construction, other earth-moving, or operational activities at the site. The first step in preparing a RAW is to meet with the DTSC team to review specific school construction plans and discuss ways that NOA mitigation can be incorporated into the school facility so that exposure to students, staff and visitors can be minimized once the school has been built. Exposure can be minimized by preventing contact with NOA containing soils.

[2] This number is derived from studies by Mactec, Addison, USEPA Region VIII, Western Australia draft health report and the European Union rule on recycled asbestos debris.

Under Section 17213.2(g) of the Education Code, DTSC is required to notify the Division of the State Architect and the Office of Public School Construction in the Department of General Services of any required design modification requirements that may impact the architectural design or construction of a proposed school facility.

8.2 California Registered Professional

The RAW should be developed and implemented or supervised by a California registered professional in accordance with the Business and Professions Code, Chapters 7 and 12.5, and the California Code of Regulations, Title 16, Chapters 5 and 29. The California registered professional (such as a registered geologist or a professional engineer) should be experienced in the identification of NOA.

8.3 Major Elements of a Removal Action Workplan (RAW)

Major elements of a RAW include:

- Removal action objectives for each media, chemical and exposure pathway;
- Site background, including site location, historical activities, geology and hydrogeology, and summary of historical investigations;
- Nature, source, and extent of NOA; summary of risk evaluation and potential health effects;
- Evaluation of remedial alternatives, individual and comparative alternative analysis, and basis for remedy selection;
- Identification of applicable or relevant and appropriate requirements (ARARs), such as, California Environmental Quality Act, Occupational Health and Safety Act, Air Toxics Control Measures, Resource Conservation and Recovery Act; Health and Safety Code, etc.;
- Removal Action Implementation Plan, including a detailed engineering plan for conducting the response action, an implementation plan, health and safety plan, transportation plan, quality assurance and quality control plan, sampling and analysis plan, site restoration, air monitoring and dust control measures;
- Implementation schedule;
- Public participation activities.

8.4 Remedy Selection

In accordance with USEPA's national guidelines, *National Oil and Hazardous Substances Pollution Contingency Plan*, the preferred response action should provide the most long-term protection, effectiveness, and permanence.

8.4.1 Applicable Remedies for NOA at School Sites

Response actions at school sites with NOA may include a combination of the following actions:

- Removal of surfacing materials or imported fill materials containing NOA;
- Covering the site with imported clean fill materials to create a barrier and prevent future exposure pathways;
- Covering or capping specified areas with buildings, hardscape, sod, or landscaping sufficient to create a barrier and prevent future exposure pathways;

- Development of an Operations and Maintenance/Monitoring Plan to ensure that the remedy remains protective in perpetuity;
- Recording a Land Use Covenant to restrict future land uses or activities at the site due to presence of hazardous materials;
- School Board Resolution prepared with restrictions on future land use or designated activities due to presence of hazardous materials.

8.4.2 Considerations for Remedy Selection

Remedy selection should also take into consideration school design and land uses at different areas of school sites, if available. Mitigation measures may vary in accordance with placement of structures, intended activities, and varying requirements for finished surfaces.

For example, higher NOA concentrations may be acceptable in limited areas where disturbances and access will not occur, such as under buildings or hardscape. DTSC may require mitigation criteria (such as 0.001% (TEM) in high use areas where soil disturbance is likely, such as playfields and dirt roads. Alternatively, DTSC may approve mitigation criteria of 0.01% TEM in areas where heavy activities are not anticipated, such as in planter boxes or in undisturbed landscaped areas). The depth of clean fill cover may also vary depending on activity level.

DTSC recommends the following mitigation actions:

- Over-excavating utility line trenches to one foot below grade, and backfill with clean soil so that future repair work will not require excavation into potential NOA materials;
- Where excess soil is generated from earth-moving activities and the proposed method of disposal is on-site burial, a colored geo-textile fabric should be used as a marker, in addition to at least one or two feet of clean soil topped with a vegetative cover or hardscape surface. The burial location should be mapped and copies retained by the school district and DTSC;
- Commitment to an architectural design, since changes or revisions may require resubmission of plan for approval by DTSC and re-notification to Division of State Architect and Office of Public School Construction.

Table 1 presents recommendations for varying thicknesses of clean fill based on the final surface finishes and anticipated activities at school sites with NOA.

TABLE 1

Surface Finishing/Feature	Recommended Mitigation Measures and/or Clean Fill Thickness
Hardscaped Areas (Buildings, Concrete/Asphalt Paved Areas, parking lots, sidewalks)	No fill
Landscaped Areas	Cover with geo-textile marker and a minimum of 1 to 2 feet of clean fill
Play Fields	Cover with geo-textile marker and a minimum of 1- to 2-feet of clean fill
Utility Corridors	Over-excavate 1 foot and clean backfill
Steep Embankments with potential storm water erosion	Shotcrete or other form of retaining wall with appropriate drainage controls
Steep Embankments	Geo-textile marker, landscape cover with hydro-seeding

8.5 Imported Fill Materials

Most RAW projects for mitigation of NOA at school sites will require imported clean fill as a barrier to prevent exposure to NOA. All sources of imported fill should be tested for NOA and other chemicals. Since there are no regulations currently in place defining requirements for clean fill, fill materials labeled as clean may in fact contain chemicals of concern that could contaminate school properties. DTSC recommends that school districts obtain DTSC approval of analytical results prior to using imported fill materials.

DTSC recommends that school districts follow the recommended sampling schedule on *DTSC Information Advisory – Clean Imported Fill Material*, available on DTSC's website at www.dtsc.ca.gov.

If the fill source is located within the 10-mile radius or in a down-slope drainage area of a known or suspected NOA containing geologic unit or feature on a geologic map, asbestos should be included as a target compound. All collected samples should be analyzed using PLM. If sample results are non-detect or trace, 10% to 25% of the samples should be selected and re-analyzed using the TEM method with a sensitivity of 0.0005% by weight.

8.6 Transportation Plan

Precautions to prevent dust generation and NOA releases during transportation should be developed and implemented as part of the Air Monitoring and Dust Mitigation Plans (see Sections 8.8 and 8.9).

A site-specific Transportation Plan should be prepared as an appendix to the RAW to address all potential concerns related to offsite transport of soils containing NOA. The Transportation Plan should include a project summary, characterization data, soil volumes, soil loading operations, decontamination procedures, transportation controls, transportation routes, offsite soil receiving

facilities, shipping documentation, recordkeeping, health and safety measures, license, insurance, and contingency plan.

8.7 Health and Safety Plan

Prior to any field activities, a Health and Safety Plan should be prepared as an appendix to the RAW to comply with state and federal Occupational Safety and Health Administration (OSHA) regulations to protect on-site workers, and to ensure that students, workers, and near-by residents are not exposed to NOA.

8.8 Air Monitoring Plan

An air monitoring plan should be developed as an addendum to the RAW to establish activities to prevent asbestos fibers from becoming airborne during RAW implementation at areas where NOA could impact students, workers, and near-by residents. This program should include personal and fixed ambient air monitoring during the grading, excavation, construction and other activities that may disturb soils potentially containing NOA. The Air Monitoring Plan should be overseen by an Air Monitoring Officer at the site. Sampling frequency may be modified in consultation with DTSC's project manager and Industrial Hygienist, depending on site-specific circumstances.

8.8.1 Air Monitoring Officer

Qualifications for the Air Monitoring Officer include relevant education and experience coupled with the knowledge, skills and abilities to perform the following responsibilities:

- Perform real time particulate monitoring, as appropriate, to ensure contaminants are not migrating off the site, and record results;
- Perform personnel and area samples, and record results;
- Monitor weather conditions using a meteorological station and/or Internet information;
- Inform all site personnel of existing conditions.

8.8.2 Meteorological (Met) Station:

Onsite ambient weather conditions (wind speed and direction, and relative humidity) should be monitored by an onsite Met Station. Data from real-time Internet weather locations and/or the National Weather Service may supplement the data from the onsite Met Station. The Air-Monitoring Officer will monitor onsite meteorological instrumentation and coordinate with offsite meteorological professionals to identify conditions that require cessation of work (e.g., winds in excess of 25 mph). All earth-moving activities should be ceased in times of high wind conditions, defined as sustained wind speeds exceeding 25 miles per hour, and/or if two wind gusts in excess of 25 mph are recorded in a 30 minute period.

8.8.3 Worker Protection - Personal Air and Dust Monitoring

Worker protection is governed by the California Occupational Safety and Health Administration (Cal-OSHA), statutes and regulations. Within the Cal-OSHA asbestos regulations, specific allowable levels are prescribed for the 8-hour time-weighted average (TWA). All results for air monitoring of workers during the

RAW implementation should be faxed to DTSC's project manager within 24 hours.

8.8.3.1 Phase Contrast Microscopy (PCM)

PCM is the method that should be used for all worker protection asbestos air samples, because NIOSH 7400 (PCM Method) is the method prescribed by Cal-OSHA. The CalOSHA Permissible Exposure Limit (PEL) is based on this sampling method. The use of other methods for determining worker exposures would not be applicable or relevant for CalOSHA compliance determinations.

PCM, manual fiber counting, uses a positive phase-contrast microscope coupled with a Walton-Beckett graticule. PCM is primarily used for estimating asbestos concentrations, though PCM does not differentiate between asbestos and other fibers. All fibers meeting the following criteria are counted: longer than 5 microns, and an aspect ratio of at least 3:1. This method does not allow for differentiation of fibers based on morphology. Although some experienced counters are capable of selectively counting only fibers which appear to be asbestiform, there is presently no accepted method for ensuring uniformity of judgment between laboratories.

8.8.3.2 Worker Protection Air Monitors

Personal air monitors should be worn by workers in the work and exclusion zones. The current Cal-OSHA 8-hour time-weighted average (TWA) Permissible Exposure Limits are: 1) asbestos 0.1 fibers per cubic centimeter of air (PCM); 2) total dust 10 milligrams per cubic meter; and 3) respirable dust 5 milligrams per cubic meter. Personal asbestos air samples should be analyzed by NIOSH 7400 PCM method with the 8-hour TWA calculation.

8.8.3.3 Action Levels

Action levels for worker exposure to asbestos dust are calculated based upon one-half of the Cal-OSHA TWA. If an action level is exceeded, the frequency or extent of control measures should be increased to reduce levels of asbestos or dust in the air. If the site cannot be reliably controlled within 15 minutes, all work shall cease. If action levels are exceeded, DTSC's project manager should be notified immediately.

For school sites with NOA, the work zone action levels are: 1) 0.05 fibers per cubic centimeter for asbestos (PCM); 2) 5 milligrams per cubic meter for total dust; and 3) 2.5 milligrams per cubic meter for respirable dust.

8.8.3.4 Personal Asbestos Air Monitors

The number of personal asbestos air monitors for workers should be proportionate and be determined in consultation with DTSC's Industrial Hygienist on a case-by-case basis.

All worker protection asbestos air monitoring should be done in compliance with Cal-OSHA (Title 8, California Code of Regulations, Sections 5208 and 1531). Instrumentation may include direct read dust monitors, such as the PDR or fiber monitors, such as the FAM, selected in consultation with DTSC's Industrial Hygienist.

8.8.3.5 Personal Dust Air Monitors

Initial dust monitoring can be accomplished with direct read dust monitors, such as the PDR. Dust levels should be data-logged in the work zone continuously for the first week. After the first week, modification of the dust monitoring plan should be discussed with DTSC's project manager and Industrial Hygienist.

If direct-read dust monitors show dust levels less than the action level, then integrated long-term dust monitoring of worker's should not be necessary. If long-term dust monitoring of the workers is necessary, an OSHA or NIOSH approved method should be utilized. The number and location of samples should be discussed on a case-by-case basis with DTSC's project manager and Industrial Hygienist.

8.8.4 Community Fenceline Monitoring

Community ambient air-monitoring stations should be used at school sites during soil removal and mitigation to measure dust and asbestos levels generated by onsite activities. The purpose of community monitoring is to ensure the effectiveness of the dust mitigation measures.

8.8.4.1 Asbestos Monitoring

8.8.4.1.1 Location and Number of Monitors

- Community reference monitor: one offsite non-directional monitor in a nearby location, such as a park or open space;
- Fenceline monitors: a minimum of two directional monitors should be placed on the property boundaries. The exact number of directional monitors, locations and air volumes should be determined by the DTSC project manager and Industrial Hygienist;
- Air samples should be collected in the breathing zone, approximately 5 feet above ground level.

Just before excavation or grading, the contractor should use a smoke tube or windsock to verify the wind direction at the site to determine where monitors should be placed,. Monitoring stations may need to be moved if the wind direction changes. These methods should be used daily to best determine monitor locations.

8.8.4.1.2 Frequency of Sampling

Daily sampling should occur for the first week of activity for all monitors. Depending on the results of the first week of air sampling and the planned field activities, the asbestos air sampling frequency may be modified in consultation with the DTSC project manager and Industrial Hygienist.

8.8.4.1.3 Analytical Methods

All asbestos air samples should be analyzed, using a TEM Method in accordance with 40 CFR Part 763 Final Rule with analytical sensitivity of 0.0005. In addition, all fibers with an aspect ratio greater than 3:1 should be counted. All sample/monitor results should be transmitted to the DTSC project manager within 24 hours during the first week. Turnaround times for subsequent weeks should be determined by the DTSC project manager and Industrial Hygienist.

8.8.4.2 Total Dust Air Monitoring

Total dust may be sampled with direct-read or integrated monitors. Direct-read instruments may continuously record data for later analysis and also provide information on a real-time basis. Integrated samples collect a known volume of air over a specified time-period, and then the sample is sent to an analytical lab for analysis. Integrated monitors are generally in compliance with local and state regulations. However, direct-read instruments should be used to screen sites and provide valuable real-time information, as follow:

- A minimum of one upwind and two or three downwind monitors should be used in a data logging mode at the perimeter fence lines on a continuous basis;
- Dust meter readings should be taken hourly during the first day of each new field activity type (e.g., excavating, grading, backfilling) and may be modified in consultation with the DTSC project manager and Industrial Hygienist;
- Use of handheld dust monitors for dust monitoring is appropriate.

8.8.4.3 Fenceline Action Levels

Whenever any trigger or action levels listed below are exceeded, the frequency or extent of dust control measures should be increased to maintain asbestos or total dust in air concentrations below the corresponding action levels; in addition, DTSC's project manager should be notified immediately. If conditions continue to exceed the trigger level(s), earth-moving activities may be stopped by DTSC after a consultation with DTSC's Industrial Hygienist. If the site air contaminants (total dusts or asbestos) cannot be controlled reliably within 15 minutes (e.g., based on dust monitor readings), all work will cease in consultation with a Certified

Industrial Hygienist. The following community action levels are applicable at fence lines:

- The fenceline trigger levels are: 1) 0.005 fibers per cubic centimeter for asbestos; 2) 0.05 milligrams per cubic meter for total dust;
- Dust levels: Consult with the Air Quality Management District for applicable dust monitoring requirements, including action levels;
- A nominal value of 0.01 fibers/cubic centimeter (PCM) or less is listed as the measure of work site cleanliness by USEPA.

8.9 Asbestos Dust Mitigation Plan

An Asbestos Dust Mitigation Plan should be prepared as an appendix to the RAW, in accordance with the requirements of the CARB Air Toxics Control Measure (ATCM), contained in Section 93105 of the California Code of Regulations [CCR]. The Plan should specify measures to control asbestos emissions during earth-moving activities. The school district and their consultant should contact the appropriate Air Quality Management District (AQMD) or Air Pollution Control District (APCD) officer for site-specific requirements. DTSC will require receipt of approval or acknowledgement of the Plan from the AQMD or APCD prior to DTSC's issuance of RAW approval.

8.9.1 Protective Measures - Pre-Construction

- Secure the NOA removal areas (e.g. signs and fencing);
- Apply sufficient water to the areas to be excavated prior to any ground disturbance.

8.9.2 Protective Measures – During Construction

- Perform work only when students are not present (if project is expansion of existing school);
- Limit on-site vehicle speed to 15 miles per hour or less as needed to prevent dust generation;
- Cover onsite traffic routes with non-asbestos materials;
- Apply sufficient water to the areas to be excavated, and continue watering throughout the removal activities to prevent dust generation yet not have runoff;
- Suspend removal activities when wind speeds are high enough to result in dust emissions (e.g. greater than 25 miles per hour);
- Keep soil stockpiles adequately wetted or covered at all times during the removal activities;
- Wash down and decontaminate all equipment and truck tires before moving them from the property onto a paved public road, and prevent any track-out of contaminated materials;
- If accidental track-out occurs, clean visible track-out on paved public roads using a high efficiency particulate air filter (HEPA filter)

equipped vacuum device within 24 hours; upgrade decontamination procedure to prevent future track-out;
- Maintain vehicles used to transport NOA materials such that no spillage can occur from holes or other openings in cargo compartments;
- Keep soil stockpiles adequately wetted, treated with a chemical dust suppressant, or covered;
- Manage the removed NOA materials in accordance with local, state, and federal laws and requirements; dispose of NOA-containing rock or soils to facilities certified to receive NOA.

8.10 Storm Water Pollution Prevention Plan

A Storm Water Pollution Prevention Plan should be prepared for prevention and control of storm water runoff from the site. The local Regional Water Quality Control Board (RWQCB) should be consulted for site-specific requirements. An approval or acknowledgement of the Storm Water Plan should be obtained from RWQCB prior to DTSC's approval of the RAW.

8.11 Removal Action Completion Report

Following implementation and completion of the removal action, the School District's consultant should prepare a Removal Action Completion Report and submit it to DTSC for review and approval. The Completion Report should document whether or not objectives stated in the DTSC-approved RAW were met. The Completion Report should also verify, if appropriate, that the ongoing operation and maintenance (O&M) activities have been implemented in accordance with a DTSC-approved post-construction O&M Plan. At a minimum, the final NOA Removal Action Completion report should include the following information:

- Current physical site setting;
- NOA sampling locations and delineation of potential NOA units at and around the site;
- Areas of NOA removal;
- Depths of excavation and backfill thickness throughout the entire site, along with depths of utility lines and building foundations;
- Final finished grade after completion of school construction;
- Data collected from air and soil, and observation during monitoring activities;
- As-Built documents;
- Statement summarizing residual risk from NOA;
- Observations, findings, and conclusion;
- A post-construction O&M Plan.

9.0 STEP 4 - LONG-TERM MONITORING AND MAINTENANCE

After completion of NOA removal and school construction, the site should no longer have any exposed NOA above the criteria specified in Section 7.7 and the approved RAW ; pathways for exposure should be reduced or eliminated by barriers. Unless all asbestos containing material has been removed from the school site, the selected remedy should also include institutional controls and long-term operation and maintenance (O&M) activities. Before DTSC can approve a RAW, DTSC will request that the school district enter into an O&M Agreement with DTSC to monitor and protect the remedy, to ensure no future NOA exposures will occur, and to have a contingency plan in case the remedy should fail. The O&M Agreement is an enforceable document that requires the school district to implement an approved O&M Plan under DTSC oversight. DTSC will prepare the O&M Agreement, while the consultant for the school district should prepare the O&M Plan.

9.1 Institutional Controls

For all sites where response actions are overseen by DTSC, and hazardous materials/substances remain at the property at levels which are not suitable for unrestricted use, California Code of Regulations (Title 22, Section 67391.1), requires that a land use covenant be executed and recorded in the county where the site is located. The remedy selected in the RAW must include institutional controls to prevent exposure to NOA. Institutional controls include land use covenants to restrict use of property (e.g., deed restrictions on specified activities, such as no digging below a specified depth), administrative controls (such as annual inspection reports); and engineering controls (such as installation of protective barriers). As a result of recent legislation (Assembly Bill 2436, effective January 2003), DTSC is required to post all sites where deed restrictions are included as part of response actions on DTSC's webpage, to be available to the general public. Additionally, annual inspections of each site must be conducted to ensure that the remedy remains protective. Results of these inspections must be provided to the county in which the site is located, to current property owners, and be kept on file at DTSC's offices. Notification of land use covenants should also be provided to Division of the State Architect and Office of Public School Construction.

In most cases, DTSC will also require notification of any activities where the remedy could be disturbed. DTSC oversight may be required to oversee such activities in order to prevent or minimize exposure to NOA. Land use covenants and deed restrictions may not be routinely reviewed for school districts, which are not required to obtain local permits prior to many school construction or modernization activities. Therefore, for school sites where NOA response actions include institutional controls, DTSC may request that school boards approve a resolution which contains the same land use restrictions as specified in deed restrictions.

9.2 Engineering and Administrative Controls

For all sites where response actions are overseen by DTSC, engineering controls, such as barriers to control exposures, may be required at sites where hazardous materials/substances are left in place. Examples of engineering controls include installation of:

- Caps or covers (paving, fill soils);

- Protective retaining walls and drainage systems (such as shotcrete);
- Geotextile liners or markers;
- Landscaping to prevent erosion and contact.

Additionally, in order to ensure that engineering controls are adequately monitored and maintained, administrative controls may also be required, to include activities such as:

- Access limitations;
- Inspections and maintenance of caps or covers;
- Worker health and safety awareness training;
- Maintenance of security measures.

9.3 Operation and Maintenance Agreement and Plan

DTSC will periodically monitor sites to ensure that the remedy remains protective of human health and the environment. Monitoring and maintenance must be provided throughout the life cycle of the remedy, which may extend for the duration of operating the facility as a school. In order for DTSC to approve a remedy where hazardous materials/substances are left in place, DTSC will require that school districts enter into an Operations and Maintenance Agreement with DTSC before site certification. This enforceable agreement will be prepared by DTSC, and will require the school district to implement an approved Operations and Maintenance Plan (O&M Plan) under DTSC oversight.

The O&M Plan should be prepared by the school district's consultant, and should contain a detailed description of the mitigation action. The O&M Plan should identify procedures for long-term operation, monitoring, inspections, data acquisition, reporting, and maintenance. Future repairs, such as equipment replacement or maintenance, or bringing in of additional fill, must be performed and documented in accordance with the approved O&M Plan. Maintenance practices may include periodic cleaning, using HEPA vacuums, and wet dusting/mopping. In accordance with state and local ordinances, leaf blowers should not be used at school sites with NOA. In the event that the remedy fails, additional investigation and remediation under DTSC will be required.

The O&M Plan should include, but not be limited to, the following:

- A map depicting all buildings, utility line trenches, finished grade elevations, and thickness of clean fills throughout the site;
- Description of periodic, routine inspection and maintenance work to be conducted at the site;
- Description of measures to clean classrooms including HEPA vacuuming and wet mopping floors and wet dusting surfaces;
- Description of repair procedures should geo fabric markers become exposed;
- Description of soil management and handling if repair or construction work is needed that requires digging into asbestos containing soils;
- Description of maintenance and monitoring activities for which DTSC oversight/approval is needed;
- Description of reporting format and frequency;

- Restrictions on any future intrusive activities that may potentially expose the NOA materials. Such activities should only be conducted after the school district has notified DTSC and obtained DTSC's approval;
- Any NOA materials brought to the surface by future excavation or trenching should be managed in accordance with the approved O&M Plan and applicable local, state, and federal laws and requirements;
- Submission of site inspection reports on a periodic basis or after triggering events (e.g. earthquake, heavy rain) that may result in exposure of NOA materials at the site;
- Deed Restrictions and/or Board Resolution.

DTSC should be contacted to provide input during the planning stages for any new construction of buildings, athletic fields, utility realignment or installation, or other activities requiring grading or excavation in soils that could contain NOA at the school.

9.4 Site Certification

DTSC will issue a certification for the school site when all of the following conditions have been met:

- All necessary response actions have been completed;
- The approved response action standards and objectives have been met and the ongoing O&M activities are maintained in accordance with an approved O&M plan;
- Post-RAW site conditions do not pose a significant risk to children or adults at the school site.

APPENDIX A

REFERENCES

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- California Department of Conservation, California Geologic Survey, *Guidelines for Geologic Investigations of Naturally Occurring Asbestos in California, 2002, Special Publication 124.*

- MACTEC *Oak Ridge High School Naturally Occurring Asbestos (NOA) Mitigation Workplan Final Report*, Prepared for El Dorado Union High School District June 2003

- MACTEC *Oak Ridge High School Naturally Occurring Asbestos (NOA) Indoor/Outdoor Air Sampling Plan* Prepared for El Dorado Union High School District July 22, 2003

- MACTEC *Oak Ridge High School Naturally Occurring Asbestos (NOA)/Mitigation Workplan Appendix B Addendum 1* Prepared for El Dorado Union High School District August 7, 2003

- MACTEC *Oak Ridge High School Naturally Occurring Asbestos (NOA)/Mitigation Appendix C Addendum 2* Prepared for El Dorado Union High School District *September 17, 2003*

- USEPA *Amphibole Mineral Fibers in Source Material in Residential and Commercial Areas of Libby, Montana, Pose and Imminent and Substantial Public Health Endangerment*; Memo to Paul Peronard, On Scene Coordinator, from Chris Weiss, Ph. D, D.A.B.T., Senior Toxicologist; December 2001

Libby activity/exposure scenario results
ORHS track/baseball study

APPENDIX B

AVAILABLE CALIFORNIA GEOLOGIC MAPS

Geologic Atlases of California (Scale 1:250,000)

- GEOLOGIC ATLAS OF CALIFORNIA: ALTURAS
  Compiled by Gay, T.E. and others, 1958

- GEOLOGIC ATLAS OF CALIFORNIA: BAKERSFIELD
  Compiled by Smith, A.R., 1964 (reprinted 1992)

- GEOLOGIC ATLAS OF CALIFORNIA: DEATH VALLEY
  Compiled by Streitz, R.L. and Stinson, M.C., 1974 (reprinted 1991)

- GEOLOGIC ATLAS OF CALIFORNIA: FRESNO
  Compiled by Matthews, R.A. and Burnett, J.L, 1965 (reprinted 1991)

- GEOLOGIC ATLAS OF CALIFORNIA: LONG BEACH
  Compiled by Jennings, C.W., 1962 (reprinted 1992)

- GEOLOGIC ATLAS OF CALIFORNIA: LOS ANGELES
  Compiled by Jennings, C.W. and Strand, R.G., 1969 (reprinted 1991)

- GEOLOGIC ATLAS OF CALIFORNIA: MARIPOSA
  Compiled by Strand, R.G., 1967 (reprinted 1991)

- GEOLOGIC ATLAS OF CALIFORNIA: NEEDLES
  Compiled by Bishop, C.C., 1963 (reprinted 1992)

- GEOLOGIC ATLAS OF CALIFORNIA: REDDING
  Compiled by Strand, R.G., 1962

- GEOLOGIC ATLAS OF CALIFORNIA: SALTON SEA
  Compiled by Jennings, C.W., 1967 (reprinted 1992)

- GEOLOGIC ATLAS OF CALIFORNIA: SAN LUIS OBISPO
  Compiled by Jennings, C.W., 1958 (reprinted 1992)

- GEOLOGIC ATLAS OF CALIFORNIA: SAN DIEGO - EL CENTRO
  Compiled by Strand, R.G., 1962 (reprinted 1992)

- GEOLOGIC ATLAS OF CALIFORNIA: SANTA ANA
  Compiled by Rogers, T.H., (reprinted 1992)

- GEOLOGIC ATLAS OF CALIFORNIA: SANTA CRUZ
  Compiled by Jennings, C.W. and Strand, R.G., 1958 (reprinted 1992)

- GEOLOGIC ATLAS OF CALIFORNIA: SANTA MARIA
  Compiled by Jennings, C.W., 1959 (reprinted 1992)

- GEOLOGIC ATLAS OF CALIFORNIA: UKIAH
  Compiled by Jennings, C.W. and Strand, R.G., 1960 (reprinted 1992)

- GEOLOGIC ATLAS OF CALIFORNIA: WALKER LAKE
  Compiled by Koenig, J.B., 1963 (reprinted 1992)

Regional Geologic Map Series (Scale 1:250,000)

- GEOLOGIC MAP OF THE SACRAMENTO QUADRANGLE
  (set of four sheets)
  Compiled by Wagner, D.L. and others, 1981

- GEOLOGIC MAP OF THE SANTA ROSA QUADRANGLE
  (set of five sheets)
  Compiled by Wagner and D.L., Bortugno, E.J. (reprinted 1999)

- GEOLOGIC MAP OF THE SAN BERNARDINO QUADRANGLE
  (set of five sheets)
  Compiled by Bortugno, E.J., and Spittler, T.E. (reprinted 1998)

- GEOLOGIC MAP OF THE WEED QUADRANGLE
  (set of four sheets)
  By Wagner, D.L. and Saucedo, G.J., 1987

- GEOLOGIC MAP OF THE SAN FRANCISCO-SAN JOSE QUADRANGLE
  (set of five sheets)
  By Wagner, D.L., Bortugno, E.J. and McJunkin, R.D., 1990
  Color-coded faults

- Diblee Foundation Maps: Coverage over 80 7½ Minute USGS Quadrangles in Santa Barbara, Ventura and Los Angeles Counties. SOURCE: Mr. E.R. Jim Blakley; 958 Isleta Avenue; Santa Barbara California 93109: Phone of Fax (805) 962-9730

- Mineral Land Classification Maps: Coverage over numerous special study areas throughout California. SOURCE: California Geologic Survey; 801 K Street, MS 14-33; Sacramento, California 95814

Local Geologic Maps

- AREAS MORE LIKELY TO CONTAIN NATURALLY-OCCURRING ASBESTOS IN WESTERN EL DORADO COUNTY, CALIFORNIA
  By Ron Churchill, March 2000
  Scale 1:100,000

- SERPENTINITE SURVEY OF LAKE COUNTY, CALIFORNIA – MAP A, ULTRAMAFIC, ULTRABASIC, AND SERPENTINE ROCK AND SOILS OF LAKE COUNTY, Adopted: March 2, 1992
  Scale: 1:100,000

Sources of USDA Soils Maps
Natural Resource Conservation Service
430 G Street. No. 4164
Davis, California 95616

California Department of Forestry and Fire Protection
6105 Airport Road
Redding, California 96002
www.fire.ca.gov

Open File Maps and Reports:

OFR 84-50 Mineral Land Classification of the Folsom [15'] Quadrangle, Amador, El Dorado, Placer, and Sacramento Counties, California. by Loyd, R.C.

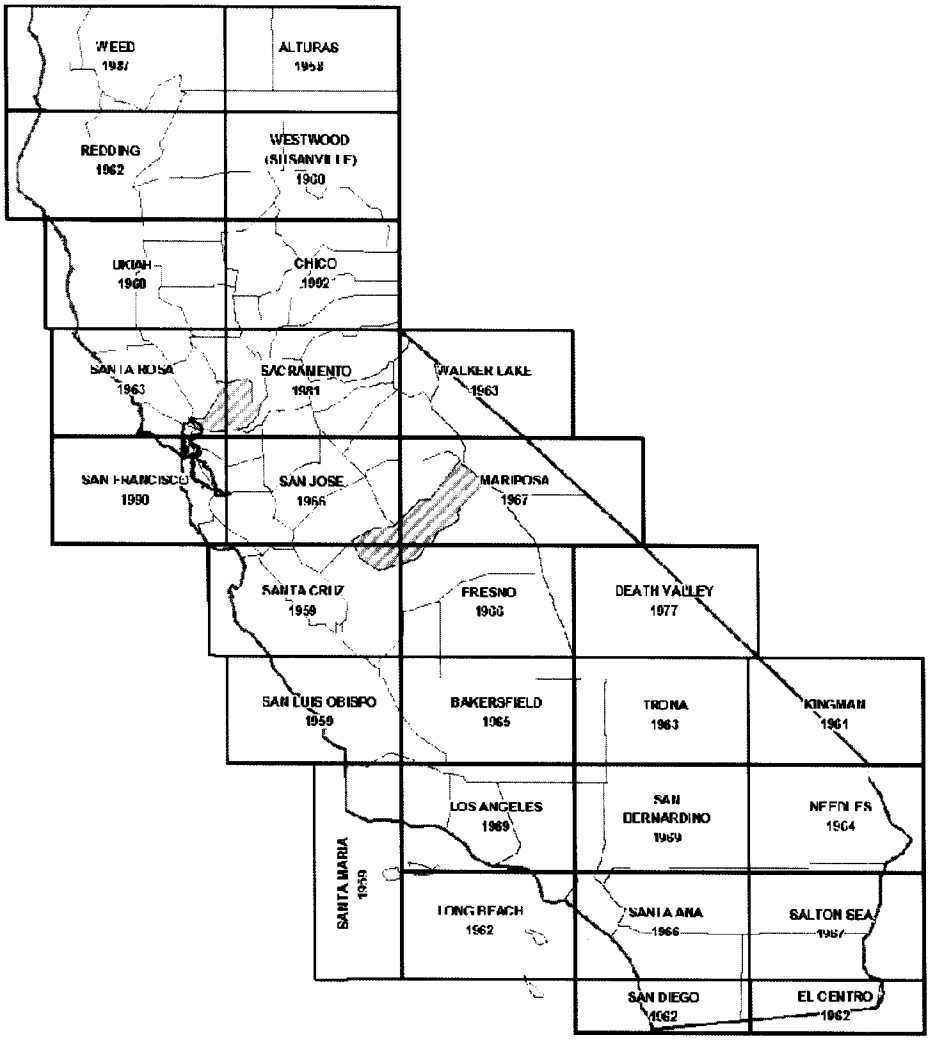
OFR 83-37 Mineral Land Classification of the Auburn [15'] Quadrangle, El Dorado and Placer Counties, California by Kohler, S.L.

OFR 83-35 Mineral Land Classification of the Georgetown [15'] Quadrangle, El Dorado and Placer Counties, California by Kohler, S.L.

OFR 83-29 Mineral Land Classification of the Placervill [15'] Quadrangle, Amador and El Dorado Counties, California by Loyd, R.C. and others

OFR 86-12 Mineral Land Classification of the Southern Half of the Bald Mountain/Browns Flat Gold Mining District, Sonora and Tuolumne Counties, California by Loyd, R.C.

INDEX TO GEOLOGIC ATLAS SERIES AND REGIONAL GEOLOGIC MAP SERIES MAPS



Counties in solid green contain ultramafic rock areas shown on the adjacent map. These areas are shown in more detail on the Division of Mines and Geology 1:250,000 scale Geologic Atlas and Regional Geologic Map Series maps. Madera and Solano counties, in diagonal pattern, have ultramafic rock areas shown on the Geologic Atlas and Regional Geologic Map Series maps that are too small to show on the adjacent map. Los Angeles County has small ultramafic rock occurrences on Catalina Island and a small occurrence is present in Kern County. Source: DMG Open-File Report 2000-19: A General Location Guide for Ultramafic Rocks in California - Areas More Likely to Contain Naturally Occurring Asbestos (DOC 2000b)

APPENDIX C

STATUTES AND REGULATIONS - ASBESTOS AND NATURALLY OCCURRING ASBESTOS

Federal Regulations

- Asbestos Standard for the Construction Industry. 29 Code of Federal Regulations (CFR) Part 1926.1101.
- Asbestos Standard. 29 CFR Part 1910.1001.
- Respiratory Protection Standard. 29 CFR Part 1910.134.

California Regulations

- CARB Section 93105-Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surface Mining Operations and CARB Section 93106-Asbestos Airborne Toxic Control Measure for Surfacing Applications. Authority cited: Sections 39600, 39601, 39650, 39658, 39659, 39666, and 41511; and Health and Safety Code. Reference: Sections 39650, 39658, 39659, 39666 and 41511.
- Cal/OSHA Asbestos Standard. Title 8, California Code of Regulations (CCR), Article 4, Section 1529, Article 110, Section 5208 and Article 2.5, Section 341.6 et seq.
- Cal/OSHA Injury and Illness Prevention Program Standard. Title 8, Sections 1509 and 3203.
- Owner Requirements. Business and Professional Code, Division 3, Chapter 9, Article 11, Section 7180 et seq.
- Hazardous Substance Removal Criteria. Health and Safety Code Section 25914.1-3.
- Asbestos Notification Act. Health and Safety Code Section 25915 et seq.
- Real Estate Disclosure. Health and Safety Code Section 25359.7
- Building Owners Responsibilities. California Labor Code Section 6501.9.
- California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65)
- Building Demolition. Health and Safety Code Section 19827.5.

County Regulations

The Naturally Occurring Asbestos and Dust Protection Ordinance; Chapter 8.44, El Dorado County Ordinance; Effective June 12, 2003

APPENDIX D

LIST OF ACRONYMS

APCD - Air Pollution Control District
AQMD - Air Quality Management District
ARAR - applicable or relevant and appropriate requirements
ASTM - American Society for Testing and Materials
Cal-OSHA – California Occupation Safety and Health Administration
CARB - California Air Resource Board
CCR - California Code of Regulations
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
DTSC - Department of Toxic Substances Control
ELAP - Environmental Laboratory Accreditation Program
HEPA - high efficiency particulate air filter
HSAA - Hazardous Substance Account Act
NIOSH – National Institute for Occupational Safety and Health
NOA - naturally occurring asbestos
O&M - operation and maintenance
PCM – phase contrast microscopy
PEA - preliminary environmental assessment
PEL - permissible exposure limit
Phase I - phase I environmental site assessment
PLM - polarized light microscopy
RAW – removal action workplan
RWQCB - Regional Water Quality Control Board
TEM – transmission electron microscopy
TWA - time-weighted average
USEPA – U.S. Environmental Protection Agency

ASBESTOS DUST MITIGATION AND AIR MONITORING PLAN

Proposed Mountain Oaks Charter School
and
Mountain Ranch Community School
1250 Pool Station Road
San Andreas, Calaveras County, California

Prepared for
Calaveras County Office of Education
185 South Main Street
PO Box 760
Angels Camp, CA 95221
(209) 736-4662

Prepared by
Condor Earth Technologies, Inc.
188 Frank West Circle, Suite I
Stockton, California 95206
(209) 234-0518

April 21, 2006
Condor Project No. 4660C

CONDOR

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ATTACHMENTS

FIGURES

HISTORICAL WEATHER DATA

CONDOR

ASBESTOS DUST MITIGATION AND AIR MONITORING PLAN

Proposed Mountain Oaks Charter School and Mountain Ranch Community School
1250 Pool Station Road
San Andreas, Calaveras County, California

1.0 INTRODUCTION AND BACKGROUND

This Asbestos Dust Mitigation and Air Monitoring Plan has been prepared by Condor Earth Technologies, Inc. (Condor) for the proposed Mountain Oaks Charter School (grades K–12) and Mountain Ranch Community School (grades 6–12) (one school, together referred to as "Site") located at 1250 Pool Station Road in San Andreas, Calaveras County, California (Figure 1, attached). This Plan is part of the Removal Action Workplan (RAW) to address the mitigation of naturally occurring asbestos (NOA) identified in Site soil.

Condor was retained by Calaveras County Office of Education (CCOE) to conduct environmental assessments on the Site. The only identified environmental condition for the Site was naturally occurring asbestos (NOA). Concentrations of NOA were detected in Site soil samples ranging from 0.016 to 0.33% asbestos by weight. Concentrations of NOA are greater than the California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC) action level of 0.001% by weight for TEM analysis identified in the *Interim Guidance for Naturally Occurring Asbestos at School Sites,* Revised 09/24/04. Based on these results, DTSC agreed with Condor's recommendation of further action at the Site in a letter dated February 14, 2006 (Appendix B of the RAW).

Due to the physical nature of NOA, any on-Site releases would likely occur during disturbance of the soil from earthwork and associated construction. Condor and DTSC recommended that action be taken to mitigate and manage the identified potential threat to Site occupants and the general public prior to construction of the proposed school.

The purpose of this plan is to define the methods for controlling dust and airborne asbestos emissions during construction and/or earthwork operations. This plan has been prepared in accordance with the California Air Resources Board (ARB) Air Toxic Control Measure (ATCM) *Final Regulation Order, Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surface Mining Operations*, dated July 29, 2002, and the DTSC NOA Guidance referenced above.

2.0 CONSTRUCTION DUST MITIGATION

The purpose of the dust mitigation portion of this plan is to define the methods to minimize emissions of asbestos-containing dust generated during construction activities. The control measures identified below apply to all activities during school construction that may generate dust from Site soil, including excavation, mass grading, utility installation, building construction, and Site traffic on unimproved surfaces. This plan requires the use of best management practices (BMPs) and compliance with the RAW, DTSC directives, and all applicable local, state, and federal laws.

2.1 TRACK-OUT PREVENTION AND CONTROL MEASURES

In the areas where vehicles exit the Site, an engineered system will be installed to prevent off-Site migration of soil. The track-out prevention measures will consist of at least one of the following:

1. An on-Site vehicle wash system between the Site and paved surfaces consisting of artificial materials or coarse aggregate base with rinsate containment, of sufficient size to accommodate construction equipment and vehicles.

2. At least one pad of coarse aggregate extending a minimum of 50 feet from pavement into the project site and 20 feet in width (Figure 2, attached).

3. Pavement extending at least 50 feet from the public roadway.

In addition, any visible soil tracked on to public roadways will be removed by wet sweeping or by a HEPA filter-equipped vacuum device as often as conditions warrant. Appropriate signage will be installed at the Site exit indicating "No Soil Track-Out Allowed".

2.2 CONTROL MEASURES FOR DISTURBED SURFACES AND STORAGE PILES

During construction activities, all disturbed soil areas and storage piles will be adequately wetted to prevent generation of airborne dust. If disturbed soil areas and storage piles are not active for more than seven days, one or more of the following measures will be implemented:

1. Application of water or chemical dust suppressants.

2. Establishment and maintenance of surface crusting sufficient to satisfy the test in subsection (h)(6) of the ATCM referenced above.

3. Installation of wind barriers across open areas or around storage piles.

4. Covering with tarps or vegetative cover.

2.3 CONTROL MEASURES FOR STAGING AREAS AND ACCESS ROADS

To control dust emissions during the project, vehicles will not be allowed to exceed 15 miles per hour on native soil surfaces. In addition, one or more of the following measures will be implemented to control fugitive dust in Site traffic areas, parking areas, staging areas, and other areas where native soil is exposed:

1. Application of water or chemical dust suppressants often enough to prevent visible dust from forming.

2. Maintaining a gravel cover over exposed native soil surfaces. The gravel cover must contain less than five percent fines, less than 0.25 percent asbestos, and be at least three inches in thickness.

2.4 CONTROL MEASURES FOR EARTHMOVING ACTIVITIES

The control dust emissions during earthmoving activities, the following measures will be implemented:

1. Pre-wetting areas to be disturbed to the depth of anticipated cuts and application of water to soil prior to land clearing.

2. Suspension of grading operations when wind speeds are high enough to result in visible dust emissions crossing the Site boundary despite dust control measures.

2.5 CONTROL MEASURES FOR OFF-SITE TRANSPORT

Transportation of Site soils off the Site is not anticipated as part of the mitigation actions. However, if the need to transport Site soil or rock should arise, the following measures to control dust emissions will be implemented:

1. Trucks will be maintained such that no spillage can occur from openings in cargo compartments.

2. All loads will be covered or placed in the cargo compartment at least six inches below the top of the cargo compartment walls and the highest portion of the load will not be above the lowest portion of the cargo compartment.

3.0 POST-CONSTRUCTION MITIGATION

Please refer to Section 7.0 of the RAW for specific details about permanent mitigation measures. In areas of hardscape construction, pavement and building materials will prevent exposure to native soil. In landscape areas of the Site, native material will be capped with clean fill soil. Following grading operations and utility trenching, a visual geotextile barrier will overlay native soil and rock. At least six inches of clean fill soil conforming to DTSC clean fill standards (containing less than 0.001% asbestos by weight confirmed by TEM analyses) will be placed on the visual geotextile barrier. Finally, vegetative cover will be installed over the clean fill soil.

4.0 RECORD KEEPING

In accordance with DTSC directives and the RAW, detailed records will be kept during implementation of the RAW. These records will include logs of construction activities, dust suppression activities, monitoring results, and other information as discussed in Section 8.3 of the RAW. Upon completion of the project, a Removal Action Completion Report will be prepared detailing the results of the mitigation and air monitoring results during the project. Copies of the report will be provided to the Air Pollution Control Officer (APCO).

5.0 HIGH CONCENTRATION AREAS

If concentrated deposits of asbestos are identified during the project, specific mitigation and management measures will be implemented in consultation with DTSC and the APCO.

5.1 MONITORING DURING CONSTRUCTION

A California Professional Geologist (PG) trained in the visual identification of NOA or other technical individual qualified and trained in the visual identification of NOA under the supervision of a PG will be on Site during all activities that disturb the subsurface during the RAW.

5.2 DISCOVERY OF CONCENTRATED NOA

The APCO and DTSC will be notified immediately upon discovery of identified NOA deposits. All subsurface work will be stopped immediately in the area and barricaded until DTSC and the APCO grant approval to continue work.

6.0 AIR AND METEOROLOGICAL MONITORING

This air and meteorological monitoring plan incorporates requirements of DTSC's guidance for NOA mitigation at school sites. It details methods of monitoring effectiveness of dust mitigation measures in

order to ensure worker and public health protection by means of measuring airborne concentrations of dust and asbestos during earth-moving activities as well as monitoring of meteorological conditions.

6.1 AIR MONITORING OFFICER

An individual with relevant education, experience, and technical skills will be designated as the Air Monitoring Officer (AMO) for the project. The AMO will be present during all earth-moving activities to implement this plan. The responsibilities of the AMO will include the following:

1. Perform real-time particulate monitoring according to this plan and record results;
2. Perform personnel and air sampling and record results;
3. Monitor and record weather conditions using on-Site meteorological equipment and National Weather Service data, and inform Site personnel;
4. Coordinate with DTSC personnel and APCO as appropriate.

6.2 AIR SAMPLING PLAN

The following sections detail specific air sampling methods to protect Site workers and of community members. Laboratory analytical results for air samples and dust monitoring results will be provided to DTSC and the APCO within 24 hours.

6.2.1 Site Worker Monitoring

All worker protection monitoring will be performed in compliance with Cal-OSHA regulations (Title 8, California Code of Regulations, Sections 5208 and 1531). At least one direct-read dust monitor will be worn by a specified individual within the work zone during earth-moving activities. During the first week, dust levels will be continuously logged. After the first week, DTSC will be consulted to modify dust monitoring requirements. All workers who are disturbing NOA-containing materials will be required to wear personal asbestos air monitors. Personal asbestos air monitors will be low-flow (2.5 liters per minute) filter cassette-type monitors and will operate continuously during the work day. Daily sampling will occur during at least the first week of activity, and at the discretion of DTSC's project manager and Industrial Hygienist thereafter.

6.2.2 Community Fenceline Monitoring

Dust and asbestos air monitoring will be conducted at the project fenceline. Dust monitoring will be conducted in one upwind and two downwind locations every hour in consultation with DTSC. One off-Site non-directional asbestos air monitor will be located in nearby open space for background reference. Two directional asbestos air monitors will be placed at downwind locations at the project fenceline (Figure 3, Attached). The directional asbestos air monitors will be high-volume (10 liters per minute) cassette-type monitors operating continuously during work days. Daily sampling will occur during at least the first week of activity, and at the discretion of DTSC's project manager and Industrial Hygienist thereafter.

6.3 LABORATORY ANALYTICAL METHODS

The air samples will be analyzed by Asbestos TEM Labs of Berkeley, California, a California Certified Laboratory (Certificate #1866). Laboratory methods will include Transmission Electron Microscopy (TEM) and Phase Contrast Microscopy (PCM). All worker personal asbestos air samples will be analyzed by NIOSH 7400 (PCM Method) and by TEM methods as necessary. Fenceline monitoring samples will be analyzed by a TEM Method with an analytical sensitivity of at least 0.0005% asbestos by weight. All

fibers with an aspect ratio greater than 3:1 will be counted. Rapid turnaround times (<24 hours) will be requested the first week of sampling and in consultation with DTSC thereafter.

6.4 QUALITY CONTROL

The QA/QC samples will consist of at least one field blank filter each day that air samples are collected. The field blank sample will be analyzed for fibers by PCM methods (NIOSH 7400) and TEM methods as necessary. All samples will be submitted under chain-of-custody procedures. All sampling equipment will be calibrated daily according to manufacturer instructions.

6.5 REPORTING

Data measured by field instruments will be recorded in field notebooks, laptops, and/or on required field forms. Examples of field documentation forms (if applicable) are included in the RAW. Units of measure for field analyses are identified on the field forms. The field data will be reviewed by the Project or Field Manager to evaluate completeness of the field records and appropriateness of the field methods employed. All field records will be retained in the project files. Upon completion of the mitigation, a Removal Action Completion Report will be submitted to DTSC and the APCO. Results of the air monitoring will be included.

6.6 ACTION LEVELS

Action levels for worker and public health protection are identified in the following subsections. If action levels are exceeded, additional dust control measures will be implemented and DTSC will immediately be notified.

6.6.1 Work Zone Action Levels

In accordance with DTSC guidance, work zone action levels for asbestos, total dust, and respirable dust will apply to this project. In order to protect Site workers during earthmoving activities, one-half of the Cal-OSHA time-weighted average (TWA) for asbestos and dust will be used. If action levels are exceeded based on measured concentrations, additional control measures will be implemented or increased in frequency to reduce levels of asbestos or dust in the air. If the additional control measures are not successful, all work shall cease and DTSC's project manager will be immediately notified. The following table identifies work zone action levels for asbestos, total dust, and respirable dust.

6.6.2 Fenceline Action Levels

Air monitoring equipment at the project fencelines will be used to measure airborne asbestos and dust concentrations.

Table 1 – Work Zone and Fenceline Action Levels

Constituent Name	Cal/OSHA PEL [a]	Work Zone Action Level	Fence Line Action Level
Asbestos	0.1 f/cc	0.05 f/cc	0.005 f/cc
Total Dust	10 mg/m^3	5 mg/m^3	0.05 mg/m^3
Respirable Dust	5 mg/m^3	2.5 mg/m^3	NA

[a] Permissible Exposure Limits (Cal/OSHA Article 107, Table AC1)
NA Not Applicable. Site dust levels will be measured using real time aerosol monitors.
f/cc fibers per cubic centimeter as measured by phase contrast microscopy (PCM) methods
mg/m^3 milligrams per cubic meter (1000 $\mu g/m^3$)

6.7 METEOROLOGICAL MONITORING

On-site weather conditions (wind speed, wind direction, and relative humidity) will be monitored by two concurrent methods; an on-site weather station and real-time Internet weather information provided by the National Weather Service (NWS) or other reliable sources. Two NWS stations that record hourly wind data with web access are located within 10 miles of the Site: Campo Seco Remote Automated Weather Station (RAWS) located 10 miles west-northwest of the Site, and Esperanza Fire Station RAWS located 10 miles east-northeast of the Site. Samples of historical weather data for these two stations are attached.

On-site meteorological monitoring will be performed simultaneously with the earthmoving activities to ensure all necessary precautions have been taken. All meteorological data collected at the Site will be documented by the Air Monitoring Officer. If sustained wind speeds exceed 25 mph at the Site or if two gusts exceeding 25 mph are logged in a 30 minute period, all soil disturbance activities will be stopped until favorable weather conditions return. Similarly, if unsafe weather conditions such as thunderstorms occur, all work will cease until conditions improve.

7.0 REFERENCES

California Air Resources Board (CARB) Air Toxic Control Measure (ATCM) Final Regulation Order, Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surface Mining Operations, dated July 29, 2002

Department of Toxic Substance Control (DTSC), California Environmental Protection Agency. *Interim Guidance for Naturally Occurring Asbestos at School Sites*, Revised 09/24/04.

Western Region Climate Center. Weather Data, Campo Seco RAWS:
http://www.wrcc.dri.edu/cgi-bin/rawMAIN.pl?caCCSC

Western Region Climate Center. Weather Data, Esperanza RAWS:
http://www.wrcc.dri.edu/cgi-bin/rawMAIN.pl?caCESP

CONDOR EARTH TECHNOLOGIES, INC.
ROUGH COST DETAIL - MITIGATION (RAW) IMPLEMENTATION
MOUNTAIN RANCH / MOUNTAIN OAKS SCHOOL
San Andreas, California
Condor No. 4660C

Date: May 1, 2006 Client: Calaveras County Office of Education
Prepared by: Alex Dewitt

ITEM	COST/ UNIT	UNIT	TOTAL COST	HANDLING	SUBTOTALS
TASK 1 - Field Activities: Monitoring and Documentation During Construction (28 working days)					
Staff Geologist (Air Monitoring Officer)	$85.00 /hr	280	$23,800.00		
Associate Geologist	$95.00 /hr	88	$8,360.00		
Senior Manager	$130.00 /hr	12	$1,560.00		
On-Site Meteorological Station	$800.00 /month	1	$800.00		
Asbestos Monitors (3 Air, fenceline)	$650.00 /month	1	$650.00	$97.50	
Asbestos Monitors (3 Air, personal)	$650.00 /month	1	$650.00	$97.50	
Dust Monitors (3)	$1,800.00 /month	1	$1,800.00	$270.00	
Vehicle	$40.00 /day	28	$1,120.00		
Mileage	$0.37 /mi	2200	$814.00		
Reimbursables	$100.00 /each	1	$100.00	$15.00	
				Task 1 Subtotal	$40,134.00
TASK 2 - Air Sample Laboratory Analyses (3 each X 28 days					
Filter Cassettes	$1.50 /each	200	$300.00	$45.00	
Asbestos (PCM 24 hr TAT) workers	$20.00 /each	84	$1,680.00	$252.00	
Asbestos (TEM 24 hr TAT) fenceline	$200.00 /each	84	$16,800.00	$2,520.00	
Associate Geologist (data management)	$95.00 /hr	24	$2,280.00		
				Task 2 Subtotal	$23,877.00
TASK 3 - Clean Imported Fill Scoping					
Staff Geologist	$85.00 /hr	16	$1,360.00		
Associate Geologist	$95.00 /hr	10	$950.00		
Senior Manager	$130.00 /hr	8	$1,040.00		
Draftsperson	$65.00 /hr	2	$130.00		
Support Staff	$45.00 /hr	2	$90.00		
Soil Sampling Kit	$20.00 /day	1	$20.00		
Vehicle	$40.00 /day	1	$40.00		
Mileage	$0.37 /mi	200	$74.00		
Reimbursables	$40.00 /each	1	$40.00	$6.00	
				Task 3 Subtotal	$3,750.00
TASK 4 - *Clean Fill Laboratory Analyses (1 sample per 2,000 cubic yards					
Asbestos in soil (TEM)	$425.00 /each	4	$1,700.00	$255.00	
CAM 17 Metals (6010/7470)	$150.00 /each	4	$600.00	$90.00	
VOCs (8260)	$100.00 /each	4	$400.00	$60.00	
SVOCs (8270)	$200.00 /each	4	$800.00	$120.00	
PCBs (8080)	$75.00 /each	4	$300.00	$45.00	
TEPH (8015M)	$80.00 /each	4	$320.00	$48.00	
Organophosphorous pesticides (EPA Method 8141)	$125.00 /each	4	$500.00	$75.00	
Chlorinated herbicides (EPA Method 8151)	$140.00 /each	4	$560.00	$84.00	
OCPs (8081A)	$90.00 /each	4	$360.00	$54.00	
Staff Geologist (sample prep and tracking)	$85.00 /hr	4	$340.00		
				Task 4 Subtotal	$6,711.00
TASK 5 - Construction Mitigation of NOA (see attached OPCC)					
Opinion of Probable Construction Costs	**$531,922.68**				
				Task 5 Subtotal	$531,922.68
TASK 6 - Removal Action Completion Report Preparation					
Staff Geologist	$85.00 /hr	48	$4,080.00		
Associate Geologist	$95.00 /hr	32	$3,040.00		
Senior Manager	$130.00 /hr	12	$1,560.00		
Draftsperson	$65.00 /hr	12	$780.00		
Support Staff	$45.00 /hr	8	$360.00		
Reimbursables	$200.00	1	$200.00	$30.00	
				Task 6 Subtotal	$10,050.00
TASK 7 - Client Meeting, Project Management and Coordination					
Associate Geologist	$95.00 /hr	48	$4,560.00		
Senior Manager	$130.00 /hr	16	$2,080.00		
Support Staff	$45.00 /hr	2	$90.00		
Reimbursables	$100.00 /each	1	$100.00	$15.00	
				Task 7 Subtotal	$6,845.00
				TOTAL:	**$623,289.68**

*Assumptions: Construction contractor will provide their workers with personal monitors, earth moving operations will be limited to 28 working days, clean fill soil source will be identified in one attempt. (OPCC = Opinion of Probable Construction Costs)

Opinion of Probable Construction Cost for Proposed NOA Mitigation Plan
4660C - Calaveras County Office of Education
San Andreas, California

Description		Quote Source	Unit Price	Quantity	Total
Sierra Geosynthetics Permeatex 2200 @ Non-hardscape Area					
Unit material		Sierra Geosynthetic	$0.11 S.F.	236,531 S.F.	$25,166.88
Unit install		Sierra Geosynthetic	$0.09 S.F.	236,531 S.F.	$22,021.02
					$47,187.89
Earthwork @ Non-hardscape Area					
Borrowed Fill Material					
Material and Hauling from Manteca per roundtrip per load		Alegre Trucking	$450.00 Load	584 Load	$262,800.00
Fill (assumed site excavation of 1-ft deep is ready for importing fill)					
Spread dumped material, by dozer, no compaction		RSMeans	$2.11 L.C.Y.	11,680 L.C.Y.	$24,699.70
Compaction					
Vibrating roller, 6" lifts, 4 passes		RSMeans	$2.30 E.C.Y.	8,760 E.C.Y.	$20,156.80
Moisture Addition to Compaction					
Water, 3000 gal. truck, 3 mile haul		RSMeans	$1.24 E.C.Y.	8,760 E.C.Y.	$10,835.74
Moisture Addition to cleaning of vehicles prior to leaving the site					
Water, 6000 gal. wagon, 3 mile haul		RSMeans	$0.76 E.C.Y.	8,760 E.C.Y.	$6,641.26
					$325,133.50
Material Quality Control and Construction Oversight	15 %				$48,770.02
					$373,903.52

	Subtotal	$421,091.42
Contingency	15 %	$63,163.71
Regional Adjustment (Sacramento)	11.32 %	$47,667.55
	Grand Total =	**$531,923**

L.C.Y. = Loose cubic yards

E.C.Y. = Embankment cubic yards

Note: The data and assumptions contained herein are not intend as design parameters and are not to be used for construction guidelines.

CONDOR

SITE SPECIFIC HEALTH AND SAFETY PLAN

SITE: 1250 Pool Station Road, San Andreas, CA
DATE: May 1, 2006
CET# 4660C
PROJECT MANAGER: Alex Dewitt
CLIENT: Calaveras Co Office of Education
CLIENT CONTACT:
John Brophy
209-736-4662

PREPARED BY:
CONDOR EARTH TECHNOLOGIES, INC.
188 Frank West Circle, Suite 1
Stockton, CA 95206
Phone: **209-234-0518**
FAX: 209-234-0538
Environmental Services Managers Alex Dewitt or Jeff Willett
E-mail: adewitt@condorearth.com
Cellular: 209-601-4631
E-mail: jwillett@condorearth.com
Cellular: 209-601-1609

CORPORATE HEALTH AND SAFETY OFFICER
Robert Job
21663 Brian Lane
P.O. Box 3905
Sonora, CA 95370
Phone: **209-532-0361**
FAX: 209-532-0773
Cellular: 209-601-0466
E-mail: bjob@condorearth.com

SITE SAFETY OFFICER: Alex Dewitt
Cellular 209-601-4631
E-mail: adewitt@condorearth.com

SUSPECTED CONTAMINANTS AT THE SITE.
Naturally Occurring Asbestos

EMERGENCY CONTACT INFORMATION
In the event of a major on-site medical emergency the Site Safety Officer shall call 911 for emergency medical services.

Any Emergency 911
Location of Nearest Telephone
1. Condor vehicle

Nearest Medical Treatment Center
Mark Twain St. Joseph's Hospital
700 Mountain Ranch Road
San Andreas, California 95249-9707
209-754-2603
*A street map to the hospital is attached.

Local Contacts
1. Fire Dept. **209-754-6639**
2. Calaveras County Environmental Health
   209 –754-6399
   891 Mountain Ranch Rd,
   San Andreas

State Contacts
1. Cal/OSHA (Modesto Office)
   209 -576-6260
   1209 Woodrow Avenue, Suite C4
2. Office of Emergency Services,
   Warning Center
   800-852-7550

Federal Contacts
1. Environmental Protection Agency (EPA)
   800- 852-7550

Purpose of Activity
1. On-Site grading and mitigation of naturally occurring asbestos (NOA) containing soil and rock.

SITE SAFETY SIGNATURE SHEET

The following site personnel have read the Health and Safety Procedures attached and are familiar with its provisions:

NAME (print)	SIGNATURE	DATE
Site Safety Officer		
Other Site Personnel		

Plan prepared by: _____ _____
(date)

Plan reviewed by: _____ _____
(Project Manager) (date)

Plan reviewed by _____ _____
(Corporate Safety Officer or Assistant) (date)

CONDOR EARTH TECHNOLOGIES, INC. GENERAL HEALTH & SAFETY PLAN FOR WORKING WITH ASBESTOS-CONTAINING SOIL

Condor Earth Technologies, Inc. has adopted the following Health & Safety Plan for working with naturally occurring asbestos, which may be encountered during excavation, earthwork, and mitigation operations. If deemed necessary upon site evaluation by the Site Safety Officer, Condor technicians will employ air-filtering masks to limit, to the extent possible, inhalation of asbestos-containing dust. The purpose of this plan is to provide health and safety precautions for the initial and subsequent site visits until the contaminant has been mitigated.

All work will be done in general accordance with current OSHA regulations and all Condor personnel working within the exclusion zone at the project site will have completed a 40-hour OSHA training course. A tailgate safety meeting will be held prior to commencement of work each day and a Health & Safety Plan will be discussed with and presented to all crewmembers for their signatures. The Asbestos Dust Mitigation and Air Monitoring Plan describes the principal methods for preventing worker exposure to asbestos containing dust.

This Health & Safety Plan is limited to provisions for safe work practices related to exposure to naturally occurring asbestos.

GENERAL SAFETY MEASURES

When working in the area of an excavation or heavy equipment activity, access to the project site shall be limited by the exclusion zone. The exclusion zone shall include an area at least 20 feet from the drill rig or excavation and associated equipment. Personnel shall not be allowed in the exclusion zone without proof of OSHA training certification and appropriate personal protective equipment.

All Condor personnel, subcontractors, and consultants shall adhere to the provisions of the Condor Site Safety Plan including all applicable elements of the Condor Illness and Injury Prevention Program (IIPP).

All of the above personnel who participate in fieldwork at the site will attend a safety indoctrination provided by the Condor Site Safety Officer. The Condor Site Safety Plan is maintained with the Work Plan. Copies of the Work Plan and Health and Safety Plan shall be available to all working units of Condor, its subcontractors, and consultants.

SITE SAFETY OFFICER RESPONSIBILITIES

The Site Safety Officer shall monitor all activities of equipment and personnel at the project site. Site Safety Officer responsibilities will include the following:

1. Limiting access to the exclusion zone to authorized personnel.
2. Providing a written log of on-site activities and events.
3. Notification of regulatory agencies during emergency procedures.
4. Enforcement of contaminant exposure site safety precautions.
5. Documenting all injuries and safety incidents.

SKIN/CLOTHES PROTECTION

Steel-toed boots will be worn during all activities.

Disposable nitrile rubber gloves will be worn for sampling (changed after each sample).

EYE/EAR PROTECTION

Safety glasses will be worn during all sampling activities.

Hearing protection will be worn during all motorized drilling activities.

VEHICLE MAINTENANCE AND SAFETY

All Condor vehicles used on site during the course of work shall be equipped with a first aid kit and a dry chemical fire extinguisher (10 BC minimum rating).

All cabs are to be kept free of all non-essential items and all loose items secured.

The rated load capacity of a vehicle is **not** to be exceeded at any time or under any circumstances.

Drill rig cables, hoses, and ropes are to be safely secured and periodically checked for abrasion or defect. Unsafe equipment shall be replaced immediately. Other equipment will be safely stored and secured when not in use.

The Site Health & Safety Officer shall review with all personnel and subcontractors the equipment inspection checklist for company vehicles. The Site Health & Safety Officer shall also confirm that the drill rig operator has performed a pre-startup safety inspection/observation prior to the start of work and that adequate water is available at the rig for emergency decontamination and washing in case a worker is exposed to contaminated water or soil.

Field vehicles shall park in an area that is a safe distance from operating equipment and vehicle traffic with the location approved by the Site Safety Officer. Care must be given when approaching heavy equipment. Personnel on foot should approach from a direction facing the operator and not a blind side. Eye-to-eye contact should be made before proceeding within the working limits of the operator and their heavy equipment.

OVERHEAD HAZARDS

Overhead hazards include utility lines and trees. Prior to performing work requiring the operation of equipment above eye level, the evaluation of overhead hazards shall be made. Equipment shall be located to maximize the clearance from overhead hazards (minimum 10 feet clearance).

UNDERGROUND UTILITIES

Condor personnel have contacted Underground Service Alert prior to drilling or excavation activities. The property owner is responsible for marking the location of their own underground utilities. The approximate location of underground utilities shall be marked on the existing ground surface. A minimum of 3 feet clearance shall be given to marked utilities. If drilling or excavation near utilities is required, hand excavation and probing shall be performed in 6-inch intervals prior to drilling or excavating activities.

MOVING AND ROTATING MACHINERY

Drilling activities involve the use of large, heavy, moving, and rotating equipment. Loose fitting clothing that can be caught or snagged should be avoided. Working gloves should be worn while working with moving metal parts and equipment.

PHYSICAL HAZARDS

CONFINED SPACES/EXCAVATIONS

Condor employees are not authorized to enter confined spaces without prior written approval from Condor's Corporate Safety Manager or designee. Excavations can be considered confined spaces. Employees are not authorized to enter excavations deeper than 5 feet without proper authorization and without proper shoring of excavation sides approved by a geotechnical engineer. Samples of excavations should be taken from material in the excavator bucket after it is brought to ground surface. Proper barricades shall be placed around open excavations when work is not in progress.

FALL PROTECTION

The Site Safety Officer will verify that all Condor employees and its subcontractors are using appropriate fall protection. The three major components of personal fall arrest protection are harness, lanyard, and secure anchorage. OSHA requires that fall protection be used anytime someone is working over six feet above the ground or the floor. MSHA requires that fall protection be used anytime a risk of falling exists.

TRIP AND SLIP PROTECTION

Good housekeeping shall be maintained at the site to prevent trip and slip hazards.

HEAT STRESS

Heat stress will be a hazard during hot weather and will be intensified when personnel are in protective clothing (if necessary). To prevent heat stress, personnel will be required to take breaks as needed and to consume adequate quantities of liquid.

SUN BURN

UV radiation is a hazard for outdoor workers. Unprotected exposure can damage the skin, eyes, and immune system. Outdoor workers have more accumulated lifetime exposure to the sun, receive up to 8 times more UV exposure, and have a 60 percent greater risk of developing skin cancer than indoor workers. Workers should use sunscreen or sun block to reduce their exposure to UV radiation. Several applications may be required during the course of the day to provide optimum protection.

BIOLOGICAL HAZARDS

STINGING INSECTS

Care should be exercised to avoid bees, yellow jackets, or other stinging or biting insects.

ANIMAL

High-topped boots should be worn when working in tall grass to protect against snakebite.

PLANT

Poison oak and poison ivy should be avoided when present on the site. If contact is made with poison oak or poison ivy wash the contact area thoroughly with soap and water as soon as possible after contact occurs.

CHEMICAL HAZARDS

INHALATION

Care should be exercised to avoid creating excess dust during sampling activities. Personnel will work up-wind of sampling locations. Potable water will be used on Site for dust control when necessary. Filtering masks will be worn in the event that dust may be inhaled.

DERMAL CONTACT

Care should be exercised to prevent contact of soil with skin. Use of gloves and disposable clothing (if necessary) will reduce skin contact with soil.

INGESTION

Eating and smoking will not be allowed within the exclusion zone.

TRAFFIC HAZARDS

Field activities taking place in public streets or on road shoulders shall use Caltrans approved flagging and traffic control during the duration of activities. While working in public streets with heavy traffic assume that the operator of a motor vehicle is unable to see you and keep a safe distance from moving traffic. Keep off roadways, when practical, and away from moving traffic. Approved safety vests will be worn by all personnel when working in areas of traffic hazard.

COMMUNICATION PROCEDURES

The following standard hand signals will be used if and when required.

Hand gripping throat.....Out of air, can't breathe

Grip partner's wrist or
both hands around waist.....Leave area immediately

Hands on top of head.....Need assistance

Thumbs up.....OK, I'm all right, I understand

Thumbs down.....No, negative

EMERGENCY RESPONSE PLAN

On-site personnel will use the following standard emergency procedures. The Site Safety Officer shall be notified of any on-site emergencies and be responsible for ensuring that the appropriate procedures are followed. Emergency Procedures should be modified as required for the incident.

Personal injury: Upon notification of an injury, the Site Safety Officer will assess the nature of the injury. If the injury is in the area of the drilling or excavating equipment, the equipment shall be shut down to eliminate running equipment hazards. Equipment will remain shut down until the Site Safety Officer authorizes work to proceed. If the cause of the injury or loss of the injured person does not affect the performance of site personnel, operations may continue.

Fire/Explosion: In the event of a fire or explosion on site, the Site Safety Officer or alternate shall call 911 (the fire department) and all personnel shall be moved to a safe distance from the involved area.

Personal Protective Equipment Failure: If any site worker experiences a failure or alteration of protective equipment that affects worker's protection, that person shall immediately proceed to the nearest staging area to repair or replace the damaged equipment. The person shall not return to the work area until the protective equipment is repaired or replaced. If the equipment cannot be repaired or replaced, the worker will proceed to the primary staging area specified by the Site Safety Officer or leave the site.

Other Equipment Failure: If any other equipment on site fails to operate properly, the Site Safety Officer shall be notified and then determine the effect of this failure on continuing operations on site. If the failure affects the safety of personnel or prevents completion of the work plan tasks, all personnel shall leave the work area until the situation is evaluated and appropriate actions taken.

EMERGENCY MEDICAL INFORMATION FOR SPECIFIC HAZARDS PRESENT:

Hazard - Heat stress

Symptoms of Exposure - Acute: Dizziness, headache, nausea, dryness of the mouth, reduced mental ability, elevated body temperature, chills, clamminess.

First Aid - Move person to a shaded, cool area. Wet person down with cool water. Wetting the head with quantities of cool water will help reduce body temperature. Have person drink cool water. Seek medical attention for severe cases.

Hazard - Particulate inhalation

Symptoms of Exposure - Acute: Nose and throat irritation, congestion, coughing, shortness of breath, asphyxiation.

First Aid - Remove person to fresh air.

Hazard - Sun burn, eye burn

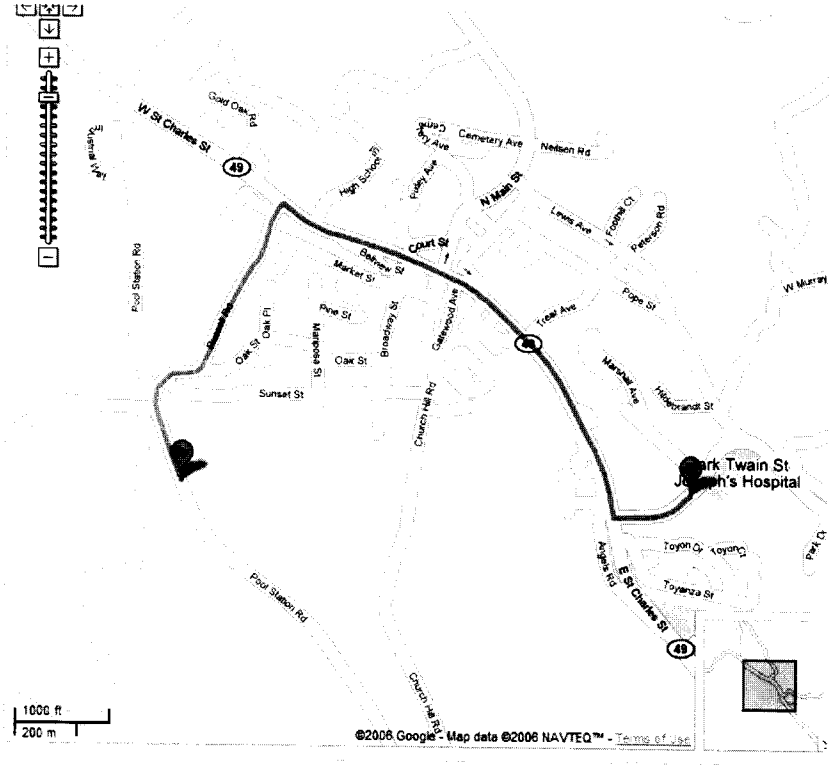
Symptoms of Exposure - Acute: Pain and discomfort of exposed area, eye irritation, leads to heat stress.

First Aid - Remove person from sunlight, flush effected area with cool, clean water. If a minor skin burn, apply first aid cream. If severe, seek medical attention.

In all on-site emergency situations, work shall not resume until:

- The conditions resulting in the emergency have been corrected.
- The hazards have been reassessed.
- The Site Safety Plan has been reviewed.
- Site personnel have been briefed on any changes to the Health & Safety Plan.
- The Site Health & Safety Officer shall critique the emergency response and follow-up.

MARK TWAIN ST JOSEPH'S HOSPITAL
700 MOUNTAIN RANCH ROAD, SAN ANDREAS, CA



Directions:

Go North on POOL STATION ROAD 0.2 miles
Bear RIGHT onto RUSSELL ROAD 0.5 miles
Turn RIGHT onto CA-49 (St. Charles Street) 1.0 mile
Turn LEFT onto MOUNTAIN RANCH ROAD 0.2 miles
Arrive at 700 MOUNTAIN RANCH ROAD, San Andreas CA

STORM WATER POLLUTION PREVENTION

This project lies within the boundaries of the Central Valley Regional Water Quality Control Board and shall conform to the requirements of the National Pollutant Discharge Elimination System (NPDES) Permit for General Construction Activities No. CAS000002, Order No, 99-08-DWQ, including State Water Resources Control Board (SWRCB) Resolution No. 2001-046 (General Permit).

The Contractor shall know and fully comply with the applicable provisions of the General Permit, and Federal, State, and local regulations that govern the Contractor's operations and storm water discharges from both the project site and areas of disturbance outside the project limits during construction. The Contractor shall maintain copies of the Permit, Storm Water Pollution Prevention Plan (SWPPP), and all required reports and inspections at the project site and shall make the Permit available during construction.

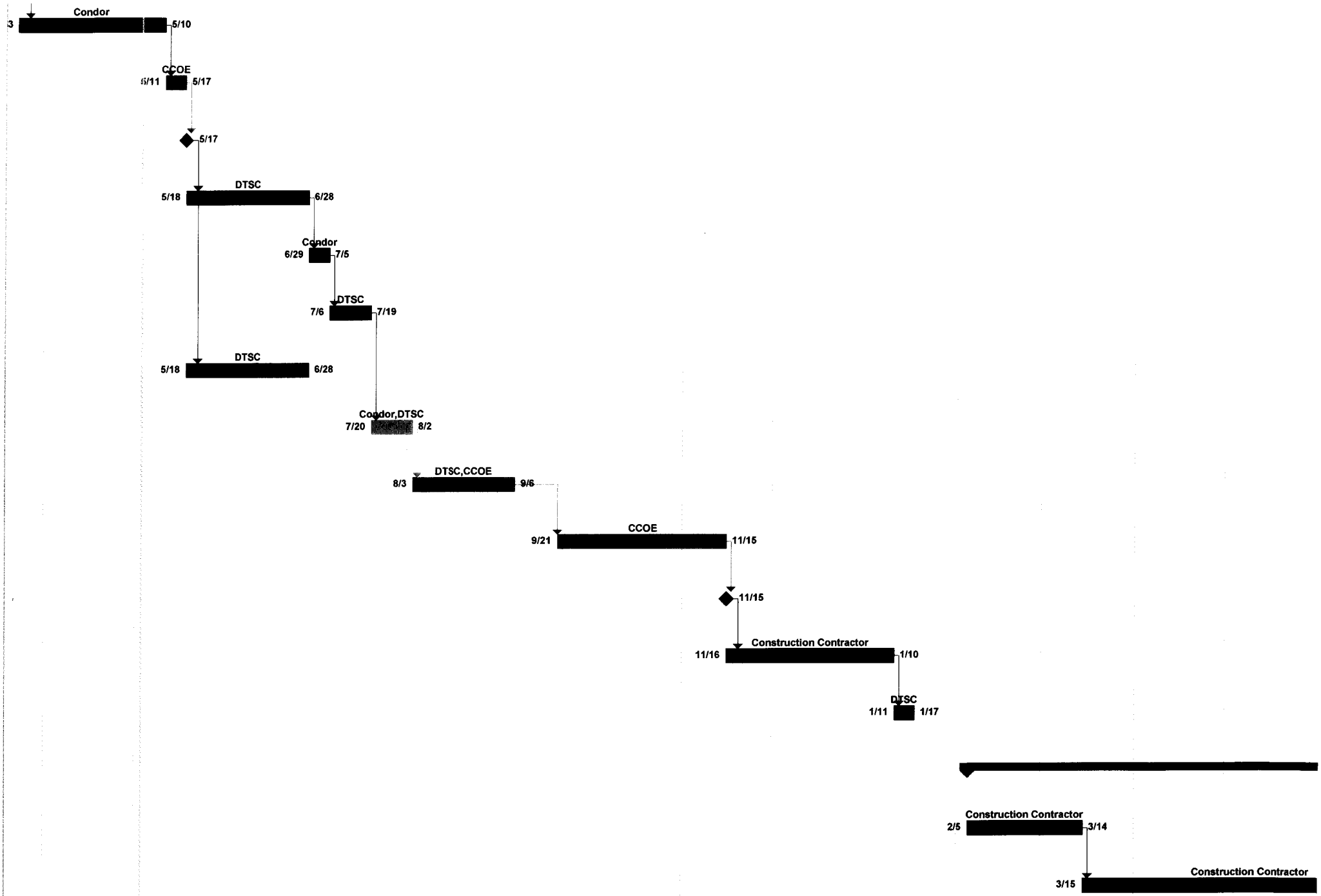
The Contractor shall implement, inspect and maintain all necessary storm water pollution control practices to satisfy all applicable Federal, State, and local laws and regulations that govern water quality.

The Contractor will prepare and submit the Notice of Intent (NOI) to comply with Permit, and a Notice of Termination at completion and acceptance of the project. In order to be in compliance with the General Permit, the contractor must:

- Develop and implement a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP must list Best Management Practices (BMPs) that will eliminate or reduce the discharge of pollutants from the construction site to waters of the United States,
- Keep the SWPPP on the site; implement it during construction activities and revise it as needed to reflect all phases of construction,
- Eliminate or reduce nonstorm water discharges to storm sewer systems and other waters of the nation,
- Perform inspections of all BMPs,

The Contractor shall notify the Engineer immediately upon request from the regulatory agencies to enter, inspect, sample, monitor or otherwise access the project site or the Contractor's records pertaining to storm water pollution control work.

The Contractor shall be responsible for the costs and for liabilities imposed by law as a result of the Contractor's failure to comply with the provisions of the General Permit and applicable Federal, State and local regulations. Costs and liabilities shall include fines, penalties and damages, whether proposed, assessed, or levied against Calaveras County Office of Education or the Contractor, including those levied under the Federal Clean Water Act and the State Porter-Cologne Water Quality Control Act, by governmental agencies or as a result of citizen suits. Penalties shall also include payments made or costs incurred in settlement for alleged violations of the General Permit, or applicable laws, regulations, or requirements. Costs incurred could include sums spent instead of penalties, in mitigation or to remediate or correct violations.


Condor
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CCOE
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DTSC
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Condor,DTSC
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DTSC,CCOE
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9/6
CCOE
9/21
11/15
11/15
Construction Contractor
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DTSC
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Construction Contractor
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3/14
Construction Contractor
3/15

Alan C. Lloyd, Ph.D.
Agency Secretary
Cal/EPA

Department of Toxic Substances Control

Maureen F. Gorsen, Director
1011 N. Grandview Avenue
Glendale, California 91201

Arnold Schwarzenegger
Governor

February 14, 2006

Mr. John Brophy
Calaveras County Office of Education
185 S. Main Street
Angels Camp, California 95221

APPROVAL OF PRELIMINARY ENVIRONMENTAL ASSESSMENT, MOUNTAIN OAKS CHARTER SCHOOL AND MOUNTAIN RANCH COMMUNITY SCHOOL, 1250 POOL STATION ROAD, SAN ANDRES, CALAVERAS (SITE CODE: 104511)

Dear Mr. Brophy:

The Department of Toxic Substances Control (DTSC) received notice on February 13, 2006 indicating the Calaveras County Office of Education (CCOE) has complied with all public review and comment requirements for the Preliminary Environmental Assessment (PEA) pursuant to California Education Code (CEC), §17213.1(a)(6)(A). The CCOE made the PEA available for public review and comment from January 10, 2006 through February 10, 2006 and held a public hearing on January 30, 2006. No comments were received regarding the draft PEA.

The PEA report (Condor Earth Technologies, Inc., December 30, 2005) received January 9, 2006, presents data collected during a previous naturally occurring asbestos (NOA) investigation activity and recommends further action in the form of a Removal Action Workplan.

The CCOE is building a Charter School (K-12) and a Community School (6-12). The 7.74-acre site consists of former cattle grazing land. Since the land was only used for cattle grazing with no indication of buildings, the only contaminant of concern is NOA.

Based on the findings of the PEA report the presence of a naturally occurring hazardous material, which would pose a threat to public health or the environment under unrestricted land use, was indicated at the site. Therefore, DTSC concurs with the conclusion of the PEA that "Further Action" for the site is required and hereby approves the PEA as final.

Pursuant to CEC §17213.2 (a), if the CCOE elects to pursue site acquisition or construction, the CCOE shall enter into an agreement with DTSC to oversee response actions at the site. Please forward a written request to amend the existing Environmental Oversight Agreement (EOA) to a School Cleanup Agreement signed by an authorized CCOE representative, to:

Ms. Robbie Morris
Oversight Agreement Coordinator
School Property Evaluation and Cleanup Division
Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, California 90630-4732

The request should include the following information:

- Docket number for the existing EOA.
- School name and DTSC site code.
- Description of further action to be conducted (Removal Action)
- Chemicals of concern at the site.
- Date of the approved PEA.
- Date of DTSC determination for response action (date of this letter).
- Designation of the representative who will coordinate agreement activities with DTSC and will be the responsible signatory on the agreement.

Ms. Morris will prepare and forward an agreement for review and signature. Subsequently, the project manager will contact the CCOE to schedule a scoping meeting. For additional information regarding the response action process or amending an agreement, please contact Ms. Morris at (714) 484-5315 or rmorris@dtsc.ca.gov.

If you have any questions please contact Ms. Tami Trearse, Project Manager at (916) 255-3747 or me at (818) 551-2821.

Sincerely,

Sharon Fair, Chief
Glendale/Sacramento Branch
School Property Evaluation and Cleanup Division

cc: See next page

cc: Mr. Michael O'Neill
Consultant/Environmental Coordinator
School Facilities Planning Division
California Department of Education
1430 N Street, Suite 1201
Sacramento, California 95814

Mr. Alex Dewitt, P.G.
Condor Earth Technologies, Inc
188 Frank West Circle, Suite 1
Stockton, California 95206

Michelle Collins
School Site Solutions, Inc
3723 Kenwood Way
Roseville, California 95747

bcc: Ms. Tami Trearse, Project Manager
Schools Unit – Sacramento Office

Ms. Robbie Morris, EOA Coordinator
Schools Unit – Cypress Office

Dr. Brian Endlich, Toxicologist
HERD – Sacramento Office

Ms. Kim Rhodes, Public Participation Specialist
Public Participation Unit – Sacramento Office

SPECD Reading File – Sacramento Office

Terry Tamminen
Agency Secretary
Cal/EPA

Department of Toxic Substances Control

B.B. Blevins, Director
1011 N. Grandview Avenue
Glendale, California 91210

Arnold Schwarzenegger
Governor

INTERIM GUIDANCE
NATURALLY OCCURRING ASBESTOS (NOA)
AT SCHOOL SITES
Revised 9/24/04

This document is issued as an Interim Guidance subject to review and revision as necessary. This guidance does not supercede or implement laws or regulations governing asbestos containing materials. The information in this Interim Guidance is intended solely as guidance and as educational reference material and should not be considered enforceable or regulatory in nature.

TABLE OF CONTENTS

1.0 INTRODUCTION

This guidance supplements other currently available Department of Toxic Substances Control (DTSC) advisories for school projects by identifying strategies for environmental assessment, investigation, mitigation, and long-term maintenance at school sites where Naturally Occurring Asbestos (NOA) is a potential compound of concern. DTSC's intent is to prevent or reduce exposure to NOA, and thereby mitigate potential health risks. This guidance is being developed for use at California school sites and DTSC cautions against using the decision criteria contained in this document for other kinds of sites without first evaluating the site specific conditions and intended land use. This guidance uses conservative thresholds because children are typically more sensitive to exposures of hazardous substances including asbestos.

All asbestos minerals are hazardous to humans. Asbestos includes six regulated naturally occurring minerals, i.e., actinolite, amosite, anthophyllite, chrysotile, crocidolite, and tremolite. Asbestos is classified as a known human cancer-causing substance by local, state, and federal health agencies. In addition, asbestos is known to cause chronic respiratory diseases. Asbestos fibers may be released into the air as a result of activities which disturb NOA-containing rock or soils. Asbestos minerals can fragment into small fibers that readily suspend in air, and are of a size visible only under a microscope. Breathing these small fiber fragments may result in an increased risk of respiratory disease or cancer in exposed individuals.

To address potential asbestos concerns, the PEA should examine if NOA is present in the surface or subsurface soils or rock on the potential school site. At the PEA evaluation step, the potential school site is typically vacant and will need excavation, grading and other activities that alter the site topography in order to construct the school facility. DTSC believes that it is more cost effective and protective to determine if asbestos is present and take precautionary measures during construction to prevent future exposures from soils that contain asbestos, rather than first constructing the campus, assessing exposure, and then mitigating the site. Therefore, if asbestos is present above conservative thresholds described below, and the school district elects to proceed with developing the site for a school, plans will need to be developed that mitigate potential releases of asbestos in soil to students, staff and the surrounding community. These plans must be developed and approved by DTSC in a Remedial Action Workplan (RAW) described in Section 8.0 "Response Actions" in this guidance. The RAW should integrate school facility layout and design with asbestos measures to optimize facility placement with minimum NOA exposure.

2.0 REGULATORY AUTHORITY FOR DTSC OVERSIGHT OF SCHOOLS

NOA has recently been identified at several California school sites. Asbestos, including NOA, is classified as a hazardous substance under the Hazardous Substance Account Act, Chapter 6.8 of the California Health and Safety Code, and the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). A list of other applicable federal, state, and county laws and regulations pertaining to asbestos is included in Appendix A. Under these authorities, DTSC may require response actions be taken at existing or prospective school sites where NOA has been released to the environment, including air, water or soil.

Prior to acquisition and/or construction of prospective school sites, the Education Code (Sections 17210 et.seq., amended since January 2000) mandates that school districts

complete environmental assessments and cleanups in order to qualify for state funding. DTSC's role is to evaluate these assessments and cleanups, to ensure that they are performed in compliance with state statutes and regulations, and in accordance with recognized standards. If prospective school sites are determined to have environmental contamination from hazardous materials, such as NOA, where there may be unacceptable health risks, they must be properly mitigated or remediated prior to occupancy for protection of human health and the environment.

This guidance does not address compliance with the Asbestos Hazard Emergency Response Act (AHERA), which was enacted in 1986 to ensure that school districts safely managed asbestos-containing-materials found in schools.

3.0 GEOLOGIC OCCURRENCE OF ASBESTOS IN CALIFORNIA

Six regulated asbestos minerals belong to two different mineral groups. Chrysotile belongs to the serpentine mineral group and the remaining asbestos minerals (actinolite, amosite, anthophyllite, crocidolite, and tremolite) belong to the amphibole mineral group. In California, the asbestos minerals are most commonly associated with ultramafic rocks and their metamorphic derivatives, including serpentinite (serpentine rock). Ultramafic rocks are those igneous rocks composed mainly of iron-magnesium silicate minerals that crystallize deep in the earth's interior. By the time they are exposed at the earth's surface, ultramafic rocks have typically undergone metamorphism, a process in which the mineralogy of the rock is changed in response to changing chemical and physical conditions. One of the commonly occurring types of metamorphism in ultramafic rocks is known as serpentinization, a process that alters the original iron-magnesium silicate minerals in ultramafic rocks to one or more water-bearing magnesium silicate minerals belonging to the serpentine mineral group and producing a rock called serpentinite. One of the asbestos minerals, chrysotile, is often present in the resulting rock. Less commonly, chrysotile may also occur in contact metamorphic rocks associated with carbonate rocks such as limestone and dolomite. Metamorphic processes may also lead to the formation of amphibole asbestos minerals in ultramafic rocks.

In California, amphibole asbestos most commonly occurs within the margins of, or immediately adjacent to, serpentinite or ultramafic rock bodies, but is less common than chrysotile asbestos. Tremolite-asbestos and actinolite-asbestos are the most common types of amphibole-asbestos in the State. They generally occur in veins associated with fault or shear zones in ultramafic rocks and serpentinite. In addition to association with ultramafic rock and serpentinite, amphibole asbestos minerals are also known to occur in association with some faults in particular geologic settings, certain non-ultramafic rock types such as schists, gabbroic rocks (in special cases), albitites, and contact metamorphic rocks associated with carbonate rocks such as limestone and dolomite. These amphibole asbestos occurrences are much less common than the ultramafic rock/serpentinite associations. Also, more recently, amphibole asbestos minerals have been found in metamorphosed volcanic rocks (e.g., Copper Hill and Gopher Ridge units) near hydrothermal and shear zones. These units have comparable units to the north and south along the Western Metamorphic Belt of the Sierra Nevada Mountains.

In addition to being associated with specific rock types, NOA may be more commonly found in or around certain geologic features such as faults or shear zones, near geologic contacts, or in or near zones of hydrothermal alteration. The asbestos minerals may be present in soils or alluvium derived from asbestos containing parent materials. Soils

developed on NOA containing rocks may be transported away from the original outcrop by the actions of water, wind, and gravity. Alluvium containing NOA may be transported many miles by the action of streams or rivers and deposited in areas far removed from the original source.

The maps of the Geologic Atlas of California and Regional Geologic Map Series published by the California Geologic Survey (formerly Division of Mines and Geology) provide general locations of ultramafic rock and serpentinite around the State. These maps may be referenced to indicate the likelihood of NOA occurrence at a proposed or existing school site. However, because of their small scale, these geologic maps may not show small occurrences of ultramafic rock or serpentinite. A list of these geologic maps is included in Appendix B.

4.0 HEALTH EFFECTS OF ASBESTOS

Health effects of asbestos are dependent primarily upon human exposure to airborne asbestos fibers. Asbestos fibers are odorless. They do not dissolve in water, and are resistant to heat, fire, chemical and biological degradation. Asbestos fibers are very small, and can be easily suspended in air and dispersed by wind or water. Risks to human health are primarily associated with inhaling asbestos fibers, which can become airborne as a result of activities that disturb rock or soil that contains asbestos.

Asbestos fibers can be inhaled deep into the lungs, where they may be retained indefinitely. Asbestos fibers can cause health effects, including respiratory disease (asbestosis), lung cancer, and mesothelioma. Mesothelioma is a rare cancer caused almost exclusively by exposure to asbestos. In addition, asbestos and tobacco smoke have a strong interactive synergism which can produce even higher incidences of lung cancer. The longer a person is exposed to asbestos and the greater the intensity of exposure, the greater the chances for a health problem. Some forms of cancer may take as many as forty years to develop; however, there is concern that even short term exposures may have significant health impacts. All forms of asbestos are considered hazardous.

Exposures to airborne asbestos fibers generated from disturbing soils have been difficult to model and quantify. Therefore, it is difficult to predict airborne asbestos fiber concentrations from the concentration of asbestos fibers in rock or soil. Because of this, a quantitative human health risk assessment with corresponding cancer risk values can not be calculated based solely on concentration of asbestos in soil. DTSC has reviewed existing empirical exposure data in experimental situations and to qualitatively assess the potential for risk. This has lead to development of a strategy to prevent or reduce potential exposures to NOA by instituting mitigative measures based on the presence of NOA in soil or rock at proposed school facilities. The intent of these measures is to either eliminate or greatly reduce possible airborne entrainment of the asbestos fibers from NOA in the rock or soil. These proposed mitigative measures are discussed in Section 8.

5.0 DTSC's FOUR STEP PROCESS

The ***NOA Decision Flowchart for School Sites*** (Figure 1) has been developed to assist school districts and their consultants in conducting environmental assessments, investigations, and response actions (if needed) at new or expanding school sites with potential NOA. The four-step process includes identification, investigation, mitigation, and monitoring. This process should be followed for new or expanding school sites; Steps 1 through 3 ordinarily will be completed prior to commencement of construction activities to build a new school. Step 4 will be included as necessary on a site-by-site basis. These Steps are described in detail in Sections 6 - 9.

- **Step 1, Identification (Phase I Environmental Site Assessment)**: In the top third of the Flowchart, boxes show information needed through record searches and site inspection during the Phase I Environmental Site Assessment (Phase I). Unless DTSC approves a No Action determination, decision points note where the school district may elect to drop a site or may proceed with further investigation if potential NOA is identified.

- **Step 2, Investigation (Preliminary Environmental Assessment)**: If NOA is potentially identified at the site, and the school district elects to continue, environmental sampling and analysis will be needed in the Preliminary Environmental Assessment (PEA), shown in the center section of the Flowchart. If NOA is positively identified at the school site, the school district must decide whether or not to proceed with site acquisition, since mitigation may be required.

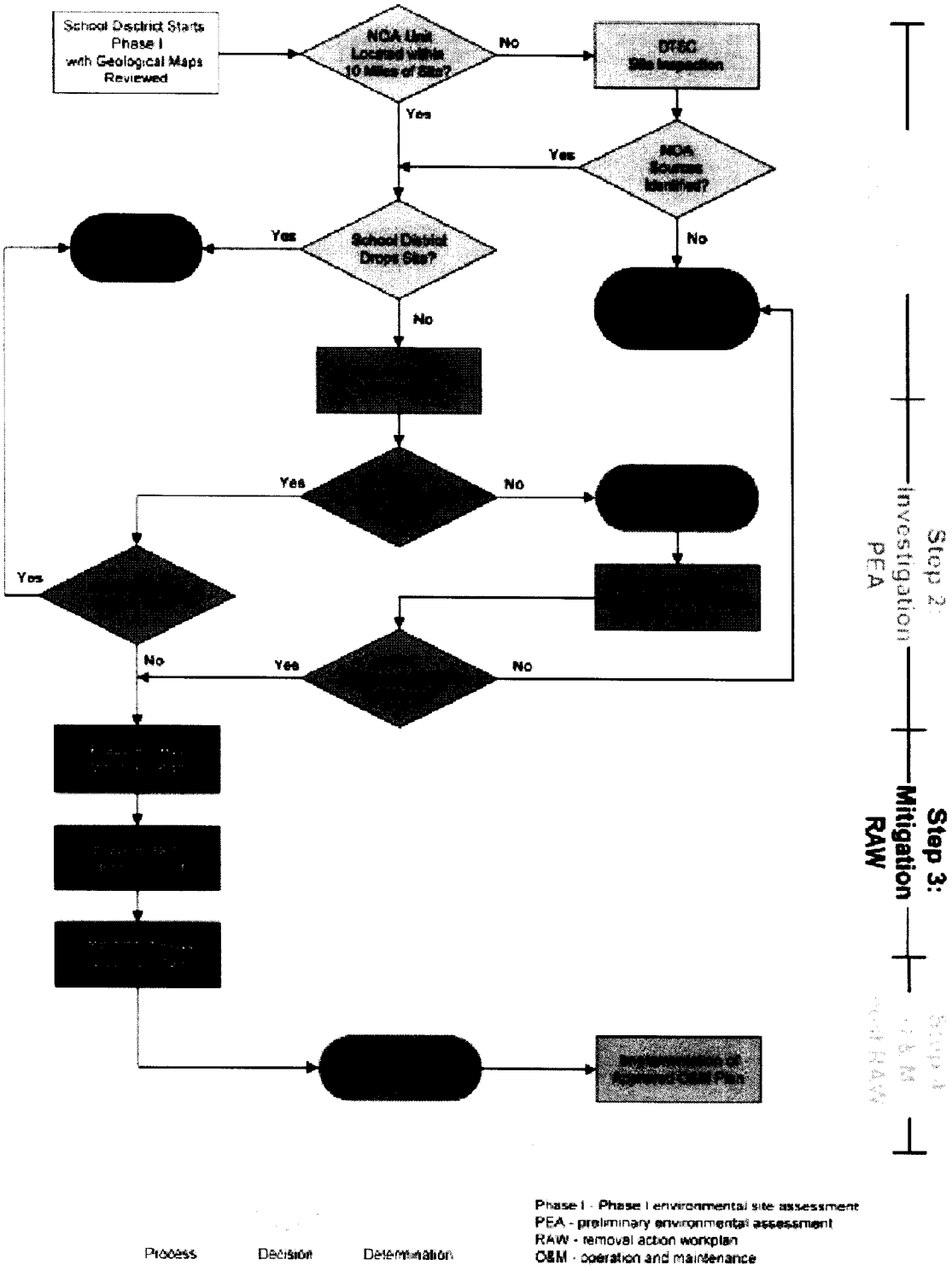
  Note: Even if Conditional No Further Action is approved, DTSC recommends that districts have a qualified professional (e.g., Registered Geologist) onsite so that geologic units that could potentially contain NOA may be identified during excavation, grading and/or construction activities that disturb the soil or rock. Such findings may necessitate re-opening of the environmental assessment process. Where NOA is later identified during excavation or school construction, school districts are required by statute to immediately stop work and notify DTSC. DTSC will evaluate site conditions before giving approval for site activities to continue.

- **Step 3, Mitigation (Response Action)**: As shown in the lower third of the Flowchart, DTSC may require a response action be taken, depending upon the concentration of NOA in soils. The response action will include preparation of a Removal Action Workplan (RAW) or Remedial Action Plan (RAP) to mitigate potential health risks by preventing or reducing exposure to NOA. The probable response action may include bringing in clean fill or other barriers to mitigate potential NOA exposures. Portions of the mitigation implementation may occur during the construction process.

- **Step 4, Long Term Operation and Maintenance (O&M)**: Prior to implementation of the response action, DTSC may require the school district enter into enforceable Agreement to provide ongoing operation and maintenance to ensure that the remedy selected for the response action will remain protective in perpetuity. Following approval of the Operation and Maintenance Plan and completion of the response action, DTSC will issue certification for the school site.

Figure 1

NATURALLY OCCURRING ASBESTOS (NOA) DECISION FLOWCHART FOR SCHOOL SITES



6.0 STEP 1 – IDENTIFICATION – PHASE I ENVIRONMENTAL SITE ASSESSMENT

Note: While this guidance focuses on the identification of NOA at school sites, the possible presence of other chemicals or compounds of concern may also need to be assessed, depending on individual site history and environmental indicators.

6.1 Phase I Environmental Site Assessment

The environmental assessment of a proposed school site begins with a Phase I Environmental Site Assessment (Phase I). According to the Education Code and California Code of Regulations, Title 22, sections 69100-69104, the Phase I shall be conducted by a qualified professional, in accordance with the American Society for Testing and Materials (ASTM) *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, (ASTM Designation E 1527 and E 1528),* Please see DTSC's *Phase I Environmental Site Assessment Advisory: School Property Evaluation*, issued September 5, 2001, available on DTSC's website at www.dtsc.ca.gov.

Note: Where the presence of NOA is strongly suspected, a school district may proceed directly with a Preliminary Environmental Assessment of the site, incorporating Phase I information.

6.2 File Review

In accordance with the requirements listed above, the purpose of the Phase I is to review all available site information (e.g., records, files and maps) to determine if there is a Recognized Environmental Condition, such as NOA, at the site. Examples of sources of information include but are not limited to maps such as the statewide asbestos map, and mineral sheets, file reports such as the USGS & CGS open file reports, and other studies. Appendix B lists several sources of information on the occurrence of NOA. The Phase I Report should include findings and supporting documentation, and reach a recommendation as to the need for Further Action or No Action. The Phase I Report prepared by the school district's consultant should be submitted to DTSC for review and approval, and should include a site inspection report.

6.3 Site Inspections

It is not always possible to determine the presence of a geologic unit of concern at a site simply from review of the geologic maps for the site. A site inspection should be conducted to observe the site for possible presence of NOA if the Phase I recommendation will be No Action.

In accordance with the Business and Professions Code, Chapters 7 and 12.5, and the California Code of Regulations, Title 16, Chapters 5 and 29, a site inspection should be conducted by a California registered professional. The California registered professional should be appropriately trained and experienced in the identification of NOA. DTSC recommends that geologists use the California Geologic Survey's Special Publication # 124: "Guidelines for Geologic Investigations of Naturally Occurring Asbestos in California" as reference for inspecting potential NOA sites.

DTSC's project manager and geologist will conduct a site inspection during the Phase I review. School districts and their consultants may accompany DTSC staff on this inspection.

NOA may occur in association with various geologic units, such as ultramafic and mafic rock and serpentinite, soils associated with these geologic units, or other geologic features such as faults, geologic contacts, or alteration zones. NOA may also be associated with fill or roadbase materials that have been imported onto the site. NOA can also be transported from off-site sources onto the site by geologic processes, such as erosion or alluvial transport. Care should be taken in the field to look for geologic units that could potentially contain NOA, such as ultramafic or mafic rock or serpentinite, and soils derived from these units. Indicators of geologic features should also be evaluated, such as fault or shear zones (scarps, overly steep slopes, disrupted drainage, etc.), geologic contacts (lithology changes, vegetation changes), alteration zones (mineralization, bleaching), or other features that may indicate potential NOA.

6.4 Determination

Based on the Phase I Report and site inspection findings, DTSC's project team and management will make a determination as to whether or not Further Action is needed for prospective school sites.

Note: At sites with possible NOA, where DTSC does not require Further Action, DTSC recommends that school districts employ a qualified professional (e.g., registered geologist) to be present during grading, excavation, construction and other earth-moving activities. Where NOA is later identified during building excavation or school construction, school districts are required by statute to immediately stop work and notify DTSC; DTSC will evaluate site conditions before giving approval for site activities to continue.

6.4.1 Further Action Determination

Further Action (i.e., completion of a Preliminary Environmental Assessment, as described in Section 7) should be recommended in the Phase I report if NOA is potentially present under any of the following conditions:

- When geologic units or features are present that could potentially contain NOA;
- When areas are identified that could have received NOA from erosion, run-off or other forces that could move soil or rock containing asbestos away from geologic units containing NOA;
- When fill soils or surfacing materials potentially containing NOA have been brought onto the site;
- When the site is located within a 10-mile radius or in a down-slope drainage area of a NOA geologic formation that could potentially contain NOA.

6.4.2 No Action Determination

A No Action Determination for NOA should be recommended if all of the following conditions are met:

- When geologic units or features that potentially contained NOA are not located within a 10-mile radius of the site;
- When no other potentially NOA related geologic features, such as geologic contacts, fault or shear zones, alteration zones, metamorphic contacts, mélanges, or alluvial deposits are identified at the site;
- When no fill soils or surfacing materials potentially containing NOA have been brought onto the site.

7.0 STEP 2 – INVESTIGATIONS – PRELIMINARY ENVIRONMENTAL ASSESSMENT

7.1 Preliminary Environmental Assessment

The Preliminary Environmental Assessment (PEA) provides basic information for determining if there has been or if there could be a release of a hazardous substance or hazardous material that presents a potential risk to human health or the environment. The PEA investigation requires collection and review of background information and chemical data to complete a screening level evaluation of the site. As required by the Education Code, the PEA should be conducted in accordance with DTSC's *Preliminary Endangerment Assessment Guidance Manual, Second Printing in June 1999*. However, as discussed in Sections 4.0 and 7.8, a Human Health Risk Assessment statistical model will not be utilized for schools with geologic units that could potentially contain NOA.

If a school district chooses to proceed with a project for which DTSC has issued a Phase I Determination requiring Further Action, DTSC will request that the school district enter into an Environmental Oversight Agreement with DTSC. This also applies to school districts which elect to bypass the Phase I and directly initiate a PEA. This agreement authorizes DTSC to oversee the PEA process, and to recover oversight costs.

Prior to commencing the required PEA field activities, the consultant for the school district should prepare a PEA workplan for DTSC review and approval. However, before the PEA workplan is submitted to DTSC for review, DTSC recommends that the school district representatives and their consultant participate in a scoping meeting to discuss the scope of work, sampling and analytical strategy for the required PEA. The school district and their consultant should gather all relevant information and prepare a conceptual strategy to share with DTSC's project team. For the investigation, DTSC's project team will likely include a project manager, unit supervisor, geologist, and toxicologist.

7.2 Preparation by Qualified Professional

School districts will need to employ a qualified and experienced professional environmental consultant to conduct the PEA, as required by Education Code Section 17210(b). For specific requirements, see DTSC Fact Sheets # 2 and 3,

dated February 2001 and November 2001, respectively, available on DTSC's website at www.dtsc.ca.gov.

7.3 Sampling Strategy for Naturally Occurring Asbestos

The first task in the PEA is the characterization of the soil to determine if NOA is present at the school site. In order to accomplish this task expeditiously, a PEA Workplan should be prepared by the school district's consultant. Prior to preparing the workplan, sampling strategy proposals should be discussed before implementation with DTSC's project team to reduce the need for remobilization and repeated sampling.

7.3.1 Soil Sampling Considerations

Because NOA may be found in identifiable geologic units and features (such as faults and outcroppings) as well as in imported fill or present in soil, different sampling strategies may be employed depending on site conditions. NOA may be present across the site in soils, or it may be confined to a relatively small area of the site, such as NOA veins within a rock outcropping. NOA may not always be immediately visible; therefore, trenching, test pits, and borings are effective methods to assess the presence of NOA in the surface and subsurface soils at a school site. DTSC recommends the following approach:

- Samples should be collected from areas that are suspected of having the highest NOA concentrations;
- If soil or aggregate is sampled and pieces appear to contain asbestos, then those pieces should be selected for analysis;
- Soil should be tested even if there is no visible source of NOA;
- Each identified geologic unit should be sampled at the interface between different units. At least two samples of each rock type should be sampled and analyzed for NOA;
- If imported fill or surfacing materials are present which could potentially contain NOA, such as serpentine aggregate, the sampling strategy should include consideration of the volume and placement of the fill material. Please see DTSC's *Information Advisory—Clean Imported Fill Material, October 2001,* available on DTSC's website at www.dtsc.ca.gov, for an overview of sampling protocols for imported fill materials.

7.3.2 Proposed and Expansion School Sites: Sampling Protocol

Because many proposed school sites can extend over many acres, both a focused sampling strategy and a strategy for likely homogenous soil areas should be used. The PEA Workplan should include a description of the proposed number and location of proposed soil matrix samples. The actual number of samples and depths may be modified in the field, based on criteria defined in the PEA Workplan and approval from DTSC team's project manager or geologist.

7.3.2.1 Focused Sampling

For sites where there are identifiable geologic units or features, such as outcroppings and faults, focused sampling should be conducted. Areas where focused sampling should occur are listed above in Section 7.3.1. The actual number and locations of samples from these areas must be based on the site inspection and in consultation with the DTSC geologist and project manager.

7.3.2.2 Homogeneous Soil Areas

As determined in consultation with DTSC's geologist, DTSC recommends that a statistical approach to generalized sampling be used for school sites or areas of the school sites which appear to be relatively homogeneous with respect to topography, lithology, or soil unit. This approach may include the following strategies:

- A minimum of one trench should be excavated for every two acres;
- Trenches should be a minimum of 10 linear feet in length;
- For each location, two sample depths should be collected; i.e., at surface and at a depth of 1 foot below the deepest point of any potential excavation (e.g., the lowest proposed construction base, utility trench base, etc.);
- Each identified soil or rock type should be sampled at the interface between different soil or rock types. At least two samples of each mineral type should be sampled and analyzed for NOA;
- Deeper samples may be archived, to be analyzed selectively, in consultation with DTSC's project manager, if NOA is not detected in surface samples.

7.3.3 Existing School Sites: Sampling Protocol

Existing schools, which are not undergoing expansions, are not subject to the requirements of DTSC oversight per the Education Code. However, some school districts have requested DTSC's assistance in investigating current site conditions at existing schools. Sampling strategies for existing school sites should be developed specifically for the current school conditions.

The sampling strategy should address the following:

- Considerations described in Section 7.3.1, as well as site-specific conditions including exposed soil, play fields, unpaved walkways, and dirt/gravel roads and parking areas;
- Areas where soil could be disturbed, potentially producing airborne asbestos fibers should be assessed;
- Consideration of use of activity pattern sampling in exposed areas, to include disturbance of the soil and air monitoring for asbestos fibers. Activity pattern sampling may be a cost-effective sampling approach in some situations, especially at existing school sites.

7.4 Geologic Log

Geologic logging should be performed or supervised by a California registered environmental professional, in accordance with professional licensing requirements for geologists and engineers, at each trenching or boring location. See also Section 6.3.

7.5 Analytical Methods for Soil and Bulk Samples

Analytical laboratories should be certified by the National Voluntary Laboratory Accreditation Program (NVLAP) and have passed a USEPA audit for environmental asbestos analysis.

Laboratory analyses of collected asbestos soil samples should be performed by either the CARB Method 435 using Polarized Light Microscopy (PLM), or United States Environmental Protection Agency's (USEPA) Bulk Method using Transmission Electron Microscopy (TEM) as described in EPA/600/R-93/116. Both methods can speciate NOA, identifying specific minerals.

Note: Results from the two methods are not directly comparable, because PLM results are reported as number of asbestos structures, and TEM results are reported as percentage of asbestos by weight.

7.5.1 Polarized Light Microscopy (PLM)

PLM uses an optical microscope equipped with two polarizing filters to observe specific optical characteristics of a sample, including particle morphology and color. PLM can identify both serpentine and amphibole asbestos, although very thin fibers of amphibole may be missed. The CARB 435 method requires that results be reported as the number of asbestos particles identified among 400 total particles. Count sheets should identify those particles counted as asbestos by: a) specific type of asbestos; and b) the number that are less than 5 microns and those greater than 5 microns in length. Specific sample preparation and analysis procedures are described in the *California Air Resources Board Method 435 Determination of Asbestos Content of Serpentine Aggregate.*

7.5.2 Transmission Electron Microscopy (TEM)

In comparison with the PLM method, the TEM method allows for greater resolution of particles, including detection and identification of smaller diameter particles, which is important when identifying amphibole asbestos. TEM is considered by many to be the most effective way of determining the presence of asbestos. TEM works by passing electrons through a very thin sample onto a detector, which then displays the image onto a monitor. Quantitative analysis methods for the determination of asbestos content using TEM have been difficult to develop; however, it is widely held that US EPA Method 600/R-93/116, Section 2.5 (quantitative) is currently the best method available for TEM analysis. This method involves the preparation of soil samples through separating asbestos fibers from the surrounding matrix. Aspect ratios are counted to show the ratio of fiber length to width. Sufficient grids should be counted to achieve a sensitivity of 0.0005% by weight.

7.5.3 Sample Preparation

California Air Resources Board (CARB) Method 435 should be used to prepare soil samples for TEM analysis. TEM analysis at school sites should incorporate US-Asbestos Hazard Emergency Response Act (AHERA) counting rules.

Sample preparation methods should be clearly described in the PEA Workplan. The Workplan should describe the kinds of equipment that the laboratory will use, and the specific steps they will employ in preparing the samples, including the filters to be counted by either PLM or TEM methods.

Note: The USEPA bulk method was originally designed for building materials, and includes preparation processes to minimize interference from glues and organic fibers often found in these products. These preparation processes, including acid digestion and ashing, should not be used for environmental samples, such as soil matrix and soil aggregate samples.

7.5.4 Data Quality

In order to assure reliable data is generated, Quality Assurance/Quality Control measures should be incorporated into the PEA Workplan and subsequent PEA Report. Because of the difficulty of preparing surrogate and spiked reference samples, duplicate sample analysis is an important tool to evaluate analysis precision. Data validation procedures should also be clearly described in the PEA Workplan and PEA Report.

Inter-laboratory and intra-laboratory analyses are recommended in order to monitor systematic errors that may develop among microscopists using the TEM method. These analyses should be designed to test both the overall method and the performance of individual microscopists. Repeating preparation of TEM grids from different sectors of a filter, followed by examination of the grids by a different microscopist is a test for the reproducibility of the whole method. However, non-uniformity of the particulate deposit on the filter may lead to differences which are not related to the performance of the microscopists. Verified fiber counting by two or more operators counting asbestos structures on the same grid penings of a TEM grid followed by resolution of any discrepancies may be used to address these differences.[1]

7.5.5 Analysis Strategy

DTSC recommends that the following steps should be taken to analyze soil and bulk samples collected from the potential school site:

- Analysis procedures should count all asbestos particles with the aspect ratio of 3:1, including those particles less than 5 microns in length;

[1] ISO 10312: 1995 Section 10.3.3

- After analysis, all soil and aggregate samples, the PLM slides and TEM filters should be archived until completion of the project, in case they are needed for data validation or if questions arise about the data results;
- All of the samples collected should be analyzed by PLM methodology, such as CARB 435, to screen a proposed school site;
- TEM analysis should be conducted at the discretion of DTSC's project management team; if sample results are non-detect or trace (below reportable detection limits) by the PLM method, 10% to 25 % of the samples should be selected and re-analyzed using the TEM method with a sensitivity of 0.0005% by weight.

7.5.6 Reporting Results

The PEA report should include the following information for NOA analyses:

- Description of any deviation from sample collection, preparation and analysis procedures described in the PEA workplan;
- Description of data validation results, including quality assurance and quality control results;
- Sample results shown on a summary table listing PLM results (percent by structures), TEM results (percent by weight) of asbestos fibers, and identification of the asbestos mineral species found in each sample;
- Count sheets for each analysis, specifying the number/dimensions of structures counted that are less than 5 microns, and those that are greater than 5 microns.

7.6 Preliminary Environmental Assessment Report

The PEA Report should be prepared by the school district's consultant to summarize fieldwork, findings and conclusions. The draft report should be submitted to DTSC for review and approval, in accordance with procedures specified in Education Code section 17213.1(a)(6). The PEA Report should also include maps illustrating surface features, sampling locations, laboratory results, and should specify locations of any areas where geologic units potentially containing NOA were visually identified at the site. The site figure should be properly scaled, and should include a north directional arrow and locations of site access roads.

Because the PEA Report requires a geologic evaluation and conclusions, the PEA Report should be stamped (required for professional engineers), signed, and dated (required for both registered geologists and engineers), and should specify the license number and expiration date of the California-registered professional who prepared the documents.

7.7 Risk Management Approach for School Sites with NOA

As discussed in Section 4.0, due to the difficulty in modeling and predicting health risks that may result from inhalation of airborne asbestos generated by disturbance of NOA containing rock or soil, a screening Health Risk Assessment will not be utilized for school sites where NOA has been identified. Instead,

mitigative measures will be required where NOA is identified in order to prevent or reduce potential exposures to NOA.

For school sites where NOA has been identified, DTSC may require Further Action (mitigation), depending on concentrations of NOA identified in soil and geologic units. This decision will be based upon sampling results from either PLM or TEM analytical methods, as specified in Sections 7.7.1 and 7.7.2.

Note: Results from the two methods are not directly comparable, because PLM results are reported as number of asbestos structures, and TEM results are reported as percentage of asbestos by weight.

7.7.1 PLM-Based Criteria

The CARB 435 PLM method, with a detection limit of 0.25% or less, may be used to screen a proposed school site. If NOA is detected at greater than or equal to 0.25 % (PLM), DTSC may require further action at school sites. Once this determination is made, school districts have the option of dropping the NOA sites, or working with DTSC to complete mitigation of NOA exposures during and after school construction.

7.7.2 TEM-Based Criteria

If NOA is detected at concentrations greater than or equal to 0.001% by weight (TEM), DTSC may require further action at school sites, depending upon the frequency and location of soil samples exceeding this concentration.

7.8 Preliminary Environmental Assessment Determination

7.8.1 No Further Action Determination

DTSC will issue a "Conditional" No Further Action determination letter to the school district if NOA is not detected at a level of 0.001% by weight (TEM) at the school site.

However, due to the uncertainty and difficulty in identifying geologic units that could potentially contain NOA, DTSC recommends a California registered professional observe future grading, and excavation or other activities that disturb the soil during school construction to ensure that potential NOA will be identified if present.

In addition, even for sites where DTSC has issued a No Further Action determination, DTSC recommends that school districts contact their local Air Pollution Control District or Air Quality Management District to determine whether or not the CARB *Air Toxic Control Measure (ATCM) Section 93105 for Construction, Grading, Quarrying, and Surface Mining Operations* will be applicable during earth-moving activities for school sites located within geologic areas that could potentially contain NOA.

7.8.2 Further Action Determination

If the PEA Report identifies detection of NOA at a level equal to or exceeding 0.25% (PLM) or 0.001% by weight (TEM), DTSC may issue a Further Action determination letter to the school district, requiring that a

response action be conducted to mitigate against possible future exposures to NOA. Some studies assessing air concentrations resulting from disturbing soils containing 0.001 % by weight (TEM) have shown elevated air concentrations of asbestos. [2] As a result, DTSC believes this concentration is an appropriate interim threshold for determining if further action or assessment is needed at a potential school site. This level may be modified in the future as more data is collected from activity/exposure studies and attendant soil concentrations.

8.0 STEP 3 – MITIGATION – RESPONSE ACTIONS

In accordance with the Education Code and the Health and Safety Code, response actions must be taken to abate or mitigate threats to human health and the environment. If a PEA identifies NOA above acceptable concentrations (as identified above in Sections 7.7 and 7.8.2) at a prospective school site, the school district may elect to drop the school project at such sites, or may proceed with the required response action.

8.1 Response Actions - Removal Action Workplan

A Removal Action Workplan (RAW), as defined by Section 25323.1 of the Health and Safety Code, is a remedy selection document required to carry out an effective removal or mitigation action that protects public health and safety, and the environment. The consultant for the school district should prepare and submit the draft RAW for DTSC's review and approval prior to implementation of any response actions.

Please see DTSC's *Schools Fact Sheet # 4, Removal Action Workplan,* revised June 2003, available on DTSC's website at http://www.DTSC.ca.gov for more information concerning the response action process. Additionally, DTSC has prepared several sample RAWs, and will provide consultation to school districts and their consultants to assist in preparation of RAWs for specific sites. DTSC will request that the school district enter into a Voluntary Cleanup Agreement (VCA) with DTSC, to allow DTSC to oversee the required removal action at the site, and to recover oversight costs. DTSC's project team may include: project manager, unit supervisor, geologist, engineer, toxicologist, public participation specialist, and industrial hygienist.

For school sites with NOA above acceptable concentrations, the RAW may generally require grading, backfill, and final surface finish (e.g. paving or clean fill) to protect students, faculty and staff from potential exposure. The RAW should also specify all measures needed to mitigate NOA releases during and after any grading, excavation, construction, other earth-moving, or operational activities at the site. The first step in preparing a RAW is to meet with the DTSC team to review specific school construction plans and discuss ways that NOA mitigation can be incorporated into the school facility so that exposure to students, staff and visitors can be minimized once the school has been built. Exposure can be minimized by preventing contact with NOA containing soils.

[2] This number is derived from studies by Mactec, Addison, USEPA Region VIII, Western Australia draft health report and the European Union rule on recycled asbestos debris.

Under Section 17213.2(g) of the Education Code, DTSC is required to notify the Division of the State Architect and the Office of Public School Construction in the Department of General Services of any required design modification requirements that may impact the architectural design or construction of a proposed school facility.

8.2 California Registered Professional

The RAW should be developed and implemented or supervised by a California registered professional in accordance with the Business and Professions Code, Chapters 7 and 12.5, and the California Code of Regulations, Title 16, Chapters 5 and 29. The California registered professional (such as a registered geologist or a professional engineer) should be experienced in the identification of NOA.

8.3 Major Elements of a Removal Action Workplan (RAW)

Major elements of a RAW include:

- Removal action objectives for each media, chemical and exposure pathway;
- Site background, including site location, historical activities, geology and hydrogeology, and summary of historical investigations;
- Nature, source, and extent of NOA; summary of risk evaluation and potential health effects;
- Evaluation of remedial alternatives, individual and comparative alternative analysis, and basis for remedy selection;
- Identification of applicable or relevant and appropriate requirements (ARARs), such as, California Environmental Quality Act, Occupational Health and Safety Act, Air Toxics Control Measures, Resource Conservation and Recovery Act; Health and Safety Code, etc.;
- Removal Action Implementation Plan, including a detailed engineering plan for conducting the response action, an implementation plan, health and safety plan, transportation plan, quality assurance and quality control plan, sampling and analysis plan, site restoration, air monitoring and dust control measures;
- Implementation schedule;
- Public participation activities.

8.4 Remedy Selection

In accordance with USEPA's national guidelines, *National Oil and Hazardous Substances Pollution Contingency Plan*, the preferred response action should provide the most long-term protection, effectiveness, and permanence.

8.4.1 Applicable Remedies for NOA at School Sites

Response actions at school sites with NOA may include a combination of the following actions:

- Removal of surfacing materials or imported fill materials containing NOA;
- Covering the site with imported clean fill materials to create a barrier and prevent future exposure pathways;
- Covering or capping specified areas with buildings, hardscape, sod, or landscaping sufficient to create a barrier and prevent future exposure pathways;

- Development of an Operations and Maintenance/Monitoring Plan to ensure that the remedy remains protective in perpetuity;
- Recording a Land Use Covenant to restrict future land uses or activities at the site due to presence of hazardous materials;
- School Board Resolution prepared with restrictions on future land use or designated activities due to presence of hazardous materials.

8.4.2 Considerations for Remedy Selection

Remedy selection should also take into consideration school design and land uses at different areas of school sites, if available. Mitigation measures may vary in accordance with placement of structures, intended activities, and varying requirements for finished surfaces.

For example, higher NOA concentrations may be acceptable in limited areas where disturbances and access will not occur, such as under buildings or hardscape. DTSC may require mitigation criteria (such as 0.001% (TEM) in high use areas where soil disturbance is likely, such as playfields and dirt roads. Alternatively, DTSC may approve mitigation criteria of 0.01% TEM in areas where heavy activities are not anticipated, such as in planter boxes or in undisturbed landscaped areas). The depth of clean fill cover may also vary depending on activity level.

DTSC recommends the following mitigation actions:

- Over-excavating utility line trenches to one foot below grade, and backfill with clean soil so that future repair work will not require excavation into potential NOA materials;
- Where excess soil is generated from earth-moving activities and the proposed method of disposal is on-site burial, a colored geo-textile fabric should be used as a marker, in addition to at least one or two feet of clean soil topped with a vegetative cover or hardscape surface. The burial location should be mapped and copies retained by the school district and DTSC;
- Commitment to an architectural design, since changes or revisions may require resubmission of plan for approval by DTSC and re-notification to Division of State Architect and Office of Public School Construction.

Table 1 presents recommendations for varying thicknesses of clean fill based on the final surface finishes and anticipated activities at school sites with NOA.

TABLE 1

Surface Finishing/Feature	Recommended Mitigation Measures and/or Clean Fill Thickness
Hardscaped Areas (Buildings, Concrete/Asphalt Paved Areas, parking lots, sidewalks)	No fill
Landscaped Areas	Cover with geo-textile marker and a minimum of 1 to 2 feet of clean fill
Play Fields	Cover with geo-textile marker and a minimum of 1- to 2-feet of clean fill
Utility Corridors	Over-excavate 1 foot and clean backfill
Steep Embankments with potential storm water erosion	Shotcrete or other form of retaining wall with appropriate drainage controls
Steep Embankments	Geo-textile marker, landscape cover with hydro-seeding

8.5 Imported Fill Materials

Most RAW projects for mitigation of NOA at school sites will require imported clean fill as a barrier to prevent exposure to NOA. All sources of imported fill should be tested for NOA and other chemicals. Since there are no regulations currently in place defining requirements for clean fill, fill materials labeled as clean may in fact contain chemicals of concern that could contaminate school properties. DTSC recommends that school districts obtain DTSC approval of analytical results prior to using imported fill materials.

DTSC recommends that school districts follow the recommended sampling schedule on *DTSC Information Advisory – Clean Imported Fill Material*, available on DTSC's website at www.dtsc.ca.gov.

If the fill source is located within the 10-mile radius or in a down-slope drainage area of a known or suspected NOA containing geologic unit or feature on a geologic map, asbestos should be included as a target compound. All collected samples should be analyzed using PLM. If sample results are non-detect or trace, 10% to 25% of the samples should be selected and re-analyzed using the TEM method with a sensitivity of 0.0005% by weight.

8.6 Transportation Plan

Precautions to prevent dust generation and NOA releases during transportation should be developed and implemented as part of the Air Monitoring and Dust Mitigation Plans (see Sections 8.8 and 8.9).

A site-specific Transportation Plan should be prepared as an appendix to the RAW to address all potential concerns related to offsite transport of soils containing NOA. The Transportation Plan should include a project summary, characterization data, soil volumes, soil loading operations, decontamination procedures, transportation controls, transportation routes, offsite soil receiving

facilities, shipping documentation, recordkeeping, health and safety measures, license, insurance, and contingency plan.

8.7 Health and Safety Plan

Prior to any field activities, a Health and Safety Plan should be prepared as an appendix to the RAW to comply with state and federal Occupational Safety and Health Administration (OSHA) regulations to protect on-site workers, and to ensure that students, workers, and near-by residents are not exposed to NOA.

8.8 Air Monitoring Plan

An air monitoring plan should be developed as an addendum to the RAW to establish activities to prevent asbestos fibers from becoming airborne during RAW implementation at areas where NOA could impact students, workers, and near-by residents. This program should include personal and fixed ambient air monitoring during the grading, excavation, construction and other activities that may disturb soils potentially containing NOA. The Air Monitoring Plan should be overseen by an Air Monitoring Officer at the site. Sampling frequency may be modified in consultation with DTSC's project manager and Industrial Hygienist, depending on site-specific circumstances.

8.8.1 Air Monitoring Officer

Qualifications for the Air Monitoring Officer include relevant education and experience coupled with the knowledge, skills and abilities to perform the following responsibilities:

- Perform real time particulate monitoring, as appropriate, to ensure contaminants are not migrating off the site, and record results;
- Perform personnel and area samples, and record results;
- Monitor weather conditions using a meteorological station and/or Internet information;
- Inform all site personnel of existing conditions.

8.8.2 Meteorological (Met) Station:

Onsite ambient weather conditions (wind speed and direction, and relative humidity) should be monitored by an onsite Met Station. Data from real-time Internet weather locations and/or the National Weather Service may supplement the data from the onsite Met Station. The Air-Monitoring Officer will monitor onsite meteorological instrumentation and coordinate with offsite meteorological professionals to identify conditions that require cessation of work (e.g., winds in excess of 25 mph). All earth-moving activities should be ceased in times of high wind conditions, defined as sustained wind speeds exceeding 25 miles per hour, and/or if two wind gusts in excess of 25 mph are recorded in a 30 minute period.

8.8.3 Worker Protection - Personal Air and Dust Monitoring

Worker protection is governed by the California Occupational Safety and Health Administration (Cal-OSHA), statutes and regulations. Within the Cal-OSHA asbestos regulations, specific allowable levels are prescribed for the 8-hour time-weighted average (TWA). All results for air monitoring of workers during the

RAW implementation should be faxed to DTSC's project manager within 24 hours.

8.8.3.1 Phase Contrast Microscopy (PCM)

PCM is the method that should be used for all worker protection asbestos air samples, because NIOSH 7400 (PCM Method) is the method prescribed by Cal-OSHA. The CalOSHA Permissible Exposure Limit (PEL) is based on this sampling method. The use of other methods for determining worker exposures would not be applicable or relevant for CalOSHA compliance determinations.

PCM, manual fiber counting, uses a positive phase-contrast microscope coupled with a Walton-Beckett graticule. PCM is primarily used for estimating asbestos concentrations, though PCM does not differentiate between asbestos and other fibers. All fibers meeting the following criteria are counted: longer than 5 microns, and an aspect ratio of at least 3:1. This method does not allow for differentiation of fibers based on morphology. Although some experienced counters are capable of selectively counting only fibers which appear to be asbestiform, there is presently no accepted method for ensuring uniformity of judgment between laboratories.

8.8.3.2 Worker Protection Air Monitors

Personal air monitors should be worn by workers in the work and exclusion zones. The current Cal-OSHA 8-hour time-weighted average (TWA) Permissible Exposure Limits are: 1) asbestos 0.1 fibers per cubic centimeter of air (PCM); 2) total dust 10 milligrams per cubic meter; and 3) respirable dust 5 milligrams per cubic meter. Personal asbestos air samples should be analyzed by NIOSH 7400 PCM method with the 8-hour TWA calculation.

8.8.3.3 Action Levels

Action levels for worker exposure to asbestos dust are calculated based upon one-half of the Cal-OSHA TWA. If an action level is exceeded, the frequency or extent of control measures should be increased to reduce levels of asbestos or dust in the air. If the site cannot be reliably controlled within 15 minutes, all work shall cease. If action levels are exceeded, DTSC's project manager should be notified immediately.

For school sites with NOA, the work zone action levels are: 1) 0.05 fibers per cubic centimeter for asbestos (PCM); 2) 5 milligrams per cubic meter for total dust; and 3) 2.5 milligrams per cubic meter for respirable dust.

8.8.3.4 Personal Asbestos Air Monitors

The number of personal asbestos air monitors for workers should be proportionate and be determined in consultation with DTSC's Industrial Hygienist on a case-by-case basis.

All worker protection asbestos air monitoring should be done in compliance with Cal-OSHA (Title 8, California Code of Regulations, Sections 5208 and 1531). Instrumentation may include direct read dust monitors, such as the PDR or fiber monitors, such as the FAM, selected in consultation with DTSC's Industrial Hygienist.

8.8.3.5 Personal Dust Air Monitors

Initial dust monitoring can be accomplished with direct read dust monitors, such as the PDR. Dust levels should be data-logged in the work zone continuously for the first week. After the first week, modification of the dust monitoring plan should be discussed with DTSC's project manager and Industrial Hygienist.

If direct-read dust monitors show dust levels less than the action level, then integrated long-term dust monitoring of worker's should not be necessary. If long-term dust monitoring of the workers is necessary, an OSHA or NIOSH approved method should be utilized. The number and location of samples should be discussed on a case-by-case basis with DTSC's project manager and Industrial Hygienist.

8.8.4 Community Fenceline Monitoring

Community ambient air-monitoring stations should be used at school sites during soil removal and mitigation to measure dust and asbestos levels generated by onsite activities. The purpose of community monitoring is to ensure the effectiveness of the dust mitigation measures.

8.8.4.1 Asbestos Monitoring

8.8.4.1.1 Location and Number of Monitors

- Community reference monitor: one offsite non-directional monitor in a nearby location, such as a park or open space;
- Fenceline monitors: a minimum of two directional monitors should be placed on the property boundaries. The exact number of directional monitors, locations and air volumes should be determined by the DTSC project manager and Industrial Hygienist;
- Air samples should be collected in the breathing zone, approximately 5 feet above ground level.

Just before excavation or grading, the contractor should use a smoke tube or windsock to verify the wind direction at the site to determine where monitors should be placed,. Monitoring stations may need to be moved if the wind direction changes. These methods should be used daily to best determine monitor locations.

8.8.4.1.2 Frequency of Sampling

Daily sampling should occur for the first week of activity for all monitors. Depending on the results of the first week of air sampling and the planned field activities, the asbestos air sampling frequency may be modified in consultation with the DTSC project manager and Industrial Hygienist.

8.8.4.1.3 Analytical Methods

All asbestos air samples should be analyzed, using a TEM Method in accordance with 40 CFR Part 763 Final Rule with analytical sensitivity of 0.0005. In addition, all fibers with an aspect ratio greater than 3:1 should be counted. All sample/monitor results should be transmitted to the DTSC project manager within 24 hours during the first week. Turnaround times for subsequent weeks should be determined by the DTSC project manager and Industrial Hygienist.

8.8.4.2 Total Dust Air Monitoring

Total dust may be sampled with direct-read or integrated monitors. Direct-read instruments may continuously record data for later analysis and also provide information on a real-time basis. Integrated samples collect a known volume of air over a specified time-period, and then the sample is sent to an analytical lab for analysis. Integrated monitors are generally in compliance with local and state regulations. However, direct-read instruments should be used to screen sites and provide valuable real-time information, as follow:

- A minimum of one upwind and two or three downwind monitors should be used in a data logging mode at the perimeter fence lines on a continuous basis;
- Dust meter readings should be taken hourly during the first day of each new field activity type (e.g., excavating, grading, backfilling) and may be modified in consultation with the DTSC project manager and Industrial Hygienist;
- Use of handheld dust monitors for dust monitoring is appropriate.

8.8.4.3 Fenceline Action Levels

Whenever any trigger or action levels listed below are exceeded, the frequency or extent of dust control measures should be increased to maintain asbestos or total dust in air concentrations below the corresponding action levels; in addition, DTSC's project manager should be notified immediately. If conditions continue to exceed the trigger level(s), earth-moving activities may be stopped by DTSC after a consultation with DTSC's Industrial Hygienist. If the site air contaminants (total dusts or asbestos) cannot be controlled reliably within 15 minutes (e.g., based on dust monitor readings), all work will cease in consultation with a Certified

Industrial Hygienist. The following community action levels are applicable at fence lines:

- The fenceline trigger levels are: 1) 0.005 fibers per cubic centimeter for asbestos; 2) 0.05 milligrams per cubic meter for total dust;
- Dust levels: Consult with the Air Quality Management District for applicable dust monitoring requirements, including action levels;
- A nominal value of 0.01 fibers/cubic centimeter (PCM) or less is listed as the measure of work site cleanliness by USEPA.

8.9 Asbestos Dust Mitigation Plan

An Asbestos Dust Mitigation Plan should be prepared as an appendix to the RAW, in accordance with the requirements of the CARB Air Toxics Control Measure (ATCM), contained in Section 93105 of the California Code of Regulations [CCR]. The Plan should specify measures to control asbestos emissions during earth-moving activities. The school district and their consultant should contact the appropriate Air Quality Management District (AQMD) or Air Pollution Control District (APCD) officer for site-specific requirements. DTSC will require receipt of approval or acknowledgement of the Plan from the AQMD or APCD prior to DTSC's issuance of RAW approval.

8.9.1 Protective Measures - Pre-Construction

- Secure the NOA removal areas (e.g. signs and fencing);
- Apply sufficient water to the areas to be excavated prior to any ground disturbance.

8.9.2 Protective Measures – During Construction

- Perform work only when students are not present (if project is expansion of existing school);
- Limit on-site vehicle speed to 15 miles per hour or less as needed to prevent dust generation;
- Cover onsite traffic routes with non-asbestos materials;
- Apply sufficient water to the areas to be excavated, and continue watering throughout the removal activities to prevent dust generation yet not have runoff;
- Suspend removal activities when wind speeds are high enough to result in dust emissions (e.g. greater than 25 miles per hour);
- Keep soil stockpiles adequately wetted or covered at all times during the removal activities;
- Wash down and decontaminate all equipment and truck tires before moving them from the property onto a paved public road, and prevent any track-out of contaminated materials;
- If accidental track-out occurs, clean visible track-out on paved public roads using a high efficiency particulate air filter (HEPA filter)

equipped vacuum device within 24 hours; upgrade decontamination procedure to prevent future track-out;

- Maintain vehicles used to transport NOA materials such that no spillage can occur from holes or other openings in cargo compartments;
- Keep soil stockpiles adequately wetted, treated with a chemical dust suppressant, or covered;
- Manage the removed NOA materials in accordance with local, state, and federal laws and requirements; dispose of NOA-containing rock or soils to facilities certified to receive NOA.

8.10 Storm Water Pollution Prevention Plan

A Storm Water Pollution Prevention Plan should be prepared for prevention and control of storm water runoff from the site. The local Regional Water Quality Control Board (RWQCB) should be consulted for site-specific requirements. An approval or acknowledgement of the Storm Water Plan should be obtained from RWQCB prior to DTSC's approval of the RAW.

8.11 Removal Action Completion Report

Following implementation and completion of the removal action, the School District's consultant should prepare a Removal Action Completion Report and submit it to DTSC for review and approval. The Completion Report should document whether or not objectives stated in the DTSC-approved RAW were met. The Completion Report should also verify, if appropriate, that the ongoing operation and maintenance (O&M) activities have been implemented in accordance with a DTSC-approved post-construction O&M Plan. At a minimum, the final NOA Removal Action Completion report should include the following information:

- Current physical site setting;
- NOA sampling locations and delineation of potential NOA units at and around the site;
- Areas of NOA removal;
- Depths of excavation and backfill thickness throughout the entire site, along with depths of utility lines and building foundations;
- Final finished grade after completion of school construction;
- Data collected from air and soil, and observation during monitoring activities;
- As-Built documents;
- Statement summarizing residual risk from NOA;
- Observations, findings, and conclusion;
- A post-construction O&M Plan.

9.0 STEP 4 - LONG-TERM MONITORING AND MAINTENANCE

After completion of NOA removal and school construction, the site should no longer have any exposed NOA above the criteria specified in Section 7.7 and the approved RAW; pathways for exposure should be reduced or eliminated by barriers. Unless all asbestos containing material has been removed from the school site, the selected remedy should also include institutional controls and long-term operation and maintenance (O&M) activities. Before DTSC can approve a RAW, DTSC will request that the school district enter into an O&M Agreement with DTSC to monitor and protect the remedy, to ensure no future NOA exposures will occur, and to have a contingency plan in case the remedy should fail. The O&M Agreement is an enforceable document that requires the school district to implement an approved O&M Plan under DTSC oversight. DTSC will prepare the O&M Agreement, while the consultant for the school district should prepare the O&M Plan.

9.1 Institutional Controls

For all sites where response actions are overseen by DTSC, and hazardous materials/substances remain at the property at levels which are not suitable for unrestricted use, California Code of Regulations (Title 22, Section 67391.1), requires that a land use covenant be executed and recorded in the county where the site is located. The remedy selected in the RAW must include institutional controls to prevent exposure to NOA. Institutional controls include land use covenants to restrict use of property (e.g., deed restrictions on specified activities, such as no digging below a specified depth), administrative controls (such as annual inspection reports); and engineering controls (such as installation of protective barriers). As a result of recent legislation (Assembly Bill 2436, effective January 2003), DTSC is required to post all sites where deed restrictions are included as part of response actions on DTSC's webpage, to be available to the general public. Additionally, annual inspections of each site must be conducted to ensure that the remedy remains protective. Results of these inspections must be provided to the county in which the site is located, to current property owners, and be kept on file at DTSC's offices. Notification of land use covenants should also be provided to Division of the State Architect and Office of Public School Construction.

In most cases, DTSC will also require notification of any activities where the remedy could be disturbed. DTSC oversight may be required to oversee such activities in order to prevent or minimize exposure to NOA. Land use covenants and deed restrictions may not be routinely reviewed for school districts, which are not required to obtain local permits prior to many school construction or modernization activities. Therefore, for school sites where NOA response actions include institutional controls, DTSC may request that school boards approve a resolution which contains the same land use restrictions as specified in deed restrictions.

9.2 Engineering and Administrative Controls

For all sites where response actions are overseen by DTSC, engineering controls, such as barriers to control exposures, may be required at sites where hazardous materials/substances are left in place. Examples of engineering controls include installation of:

- Caps or covers (paving, fill soils);

- Protective retaining walls and drainage systems (such as shotcrete);
- Geotextile liners or markers;
- Landscaping to prevent erosion and contact.

Additionally, in order to ensure that engineering controls are adequately monitored and maintained, administrative controls may also be required, to include activities such as:

- Access limitations;
- Inspections and maintenance of caps or covers;
- Worker health and safety awareness training;
- Maintenance of security measures.

9.3 Operation and Maintenance Agreement and Plan

DTSC will periodically monitor sites to ensure that the remedy remains protective of human health and the environment. Monitoring and maintenance must be provided throughout the life cycle of the remedy, which may extend for the duration of operating the facility as a school. In order for DTSC to approve a remedy where hazardous materials/substances are left in place, DTSC will require that school districts enter into an Operations and Maintenance Agreement with DTSC before site certification. This enforceable agreement will be prepared by DTSC, and will require the school district to implement an approved Operations and Maintenance Plan (O&M Plan) under DTSC oversight.

The O&M Plan should be prepared by the school district's consultant, and should contain a detailed description of the mitigation action. The O&M Plan should identify procedures for long-term operation, monitoring, inspections, data acquisition, reporting, and maintenance. Future repairs, such as equipment replacement or maintenance, or bringing in of additional fill, must be performed and documented in accordance with the approved O&M Plan. Maintenance practices may include periodic cleaning, using HEPA vacuums, and wet dusting/mopping. In accordance with state and local ordinances, leaf blowers should not be used at school sites with NOA. In the event that the remedy fails, additional investigation and remediation under DTSC will be required.

The O&M Plan should include, but not be limited to, the following:

- A map depicting all buildings, utility line trenches, finished grade elevations, and thickness of clean fills throughout the site;
- Description of periodic, routine inspection and maintenance work to be conducted at the site;
- Description of measures to clean classrooms including HEPA vacuuming and wet mopping floors and wet dusting surfaces;
- Description of repair procedures should geo fabric markers become exposed;
- Description of soil management and handling if repair or construction work is needed that requires digging into asbestos containing soils;
- Description of maintenance and monitoring activities for which DTSC oversight/approval is needed;
- Description of reporting format and frequency;

- Restrictions on any future intrusive activities that may potentially expose the NOA materials. Such activities should only be conducted after the school district has notified DTSC and obtained DTSC's approval;
- Any NOA materials brought to the surface by future excavation or trenching should be managed in accordance with the approved O&M Plan and applicable local, state, and federal laws and requirements;
- Submission of site inspection reports on a periodic basis or after triggering events (e.g. earthquake, heavy rain) that may result in exposure of NOA materials at the site;
- Deed Restrictions and/or Board Resolution.

DTSC should be contacted to provide input during the planning stages for any new construction of buildings, athletic fields, utility realignment or installation, or other activities requiring grading or excavation in soils that could contain NOA at the school.

9.4 Site Certification

DTSC will issue a certification for the school site when all of the following conditions have been met:

- All necessary response actions have been completed;
- The approved response action standards and objectives have been met and the ongoing O&M activities are maintained in accordance with an approved O&M plan;
- Post-RAW site conditions do not pose a significant risk to children or adults at the school site.

APPENDIX A

REFERENCES

- Addison, J, LST Davies, etal *The Release of Dispersed Asbestos Fibres from Soils*; Institute of Occupational Medicine Research Report, September 1988

- California Environmental Protection Agency, Air Resources Board, Final Regulation Order, Section 93105, *Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surfacing Mining Operations*.

- California Environmental Protection Agency, Air Resources Board, *Implementation Guidance Document for the Asbestos Airborne Toxic Control Measure for Surfacing Applications, July 2002*.

- California Department of Conservation, California Geologic Survey, *Guidelines for Geologic Investigations of Naturally Occurring Asbestos in California, 2002, Special Publication 124*.

- MACTEC *Oak Ridge High School Naturally Occurring Asbestos (NOA) Mitigation Workplan Final Report*, Prepared for El Dorado Union High School District June 2003

- MACTEC *Oak Ridge High School Naturally Occurring Asbestos (NOA) Indoor/Outdoor Air Sampling Plan* Prepared for El Dorado Union High School District July 22, 2003

- MACTEC *Oak Ridge High School Naturally Occurring Asbestos (NOA)/Mitigation Workplan Appendix B Addendum 1* Prepared for El Dorado Union High School District August 7, 2003

- MACTEC *Oak Ridge High School Naturally Occurring Asbestos (NOA)/Mitigation Appendix C Addendum 2* Prepared for El Dorado Union High School District *September 17, 2003*

- USEPA *Amphibole Mineral Fibers in Source Material in Residential and Commercial Areas of Libby, Montana, Pose and Imminent and Substantial Public Health Endangerment*; Memo to Paul Peronard, On Scene Coordinator, from Chris Weiss, Ph. D, D.A.B.T., Senior Toxicologist; December 2001

Libby activity/exposure scenario results
ORHS track/baseball study

APPENDIX B

AVAILABLE CALIFORNIA GEOLOGIC MAPS

Geologic Atlases of California (Scale 1:250,000)

- GEOLOGIC ATLAS OF CALIFORNIA: ALTURAS
  Compiled by Gay, T.E. and others, 1958
- GEOLOGIC ATLAS OF CALIFORNIA: BAKERSFIELD
  Compiled by Smith, A.R., 1964 (reprinted 1992)
- GEOLOGIC ATLAS OF CALIFORNIA: DEATH VALLEY
  Compiled by Streitz, R.L. and Stinson, M.C., 1974 (reprinted 1991)
- GEOLOGIC ATLAS OF CALIFORNIA: FRESNO
  Compiled by Matthews, R.A. and Burnett, J.L, 1965 (reprinted 1991)
- GEOLOGIC ATLAS OF CALIFORNIA: LONG BEACH
  Compiled by Jennings, C.W., 1962 (reprinted 1992)
- GEOLOGIC ATLAS OF CALIFORNIA: LOS ANGELES
  Compiled by Jennings, C.W. and Strand, R.G., 1969 (reprinted 1991)
- GEOLOGIC ATLAS OF CALIFORNIA: MARIPOSA
  Compiled by Strand, R.G., 1967 (reprinted 1991)
- GEOLOGIC ATLAS OF CALIFORNIA: NEEDLES
  Compiled by Bishop, C.C., 1963 (reprinted 1992)
- GEOLOGIC ATLAS OF CALIFORNIA: REDDING
  Compiled by Strand, R.G., 1962
- GEOLOGIC ATLAS OF CALIFORNIA: SALTON SEA
  Compiled by Jennings, C.W., 1967 (reprinted 1992)
- GEOLOGIC ATLAS OF CALIFORNIA: SAN LUIS OBISPO
  Compiled by Jennings, C.W., 1958 (reprinted 1992)
- GEOLOGIC ATLAS OF CALIFORNIA: SAN DIEGO - EL CENTRO
  Compiled by Strand, R.G., 1962 (reprinted 1992)
- GEOLOGIC ATLAS OF CALIFORNIA: SANTA ANA
  Compiled by Rogers, T.H., (reprinted 1992)
- GEOLOGIC ATLAS OF CALIFORNIA: SANTA CRUZ
  Compiled by Jennings, C.W. and Strand, R.G., 1958 (reprinted 1992)

- GEOLOGIC ATLAS OF CALIFORNIA: SANTA MARIA
  Compiled by Jennings, C.W., 1959 (reprinted 1992)

- GEOLOGIC ATLAS OF CALIFORNIA: UKIAH
  Compiled by Jennings, C.W. and Strand, R.G., 1960 (reprinted 1992)

- GEOLOGIC ATLAS OF CALIFORNIA: WALKER LAKE
  Compiled by Koenig, J.B., 1963 (reprinted 1992)

Regional Geologic Map Series (Scale 1:250,000)

- GEOLOGIC MAP OF THE SACRAMENTO QUADRANGLE
  (set of four sheets)
  Compiled by Wagner, D.L. and others, 1981

- GEOLOGIC MAP OF THE SANTA ROSA QUADRANGLE
  (set of five sheets)
  Compiled by Wagner and D.L., Bortugno, E.J. (reprinted 1999)

- GEOLOGIC MAP OF THE SAN BERNARDINO QUADRANGLE
  (set of five sheets)
  Compiled by Bortugno, E.J., and Spittler, T.E. (reprinted 1998)

- GEOLOGIC MAP OF THE WEED QUADRANGLE
  (set of four sheets)
  By Wagner, D.L. and Saucedo, G.J., 1987

- GEOLOGIC MAP OF THE SAN FRANCISCO-SAN JOSE QUADRANGLE
  (set of five sheets)
  By Wagner, D.L., Bortugno, E.J. and McJunkin, R.D., 1990
  Color-coded faults

- Diblee Foundation Maps: Coverage over 80 7½ Minute USGS Quadrangles in Santa Barbara, Ventura and Los Angeles Counties. SOURCE: Mr. E.R. Jim Blakley; 958 Isleta Avenue; Santa Barbara California 93109: Phone of Fax (805) 962-9730

- Mineral Land Classification Maps: Coverage over numerous special study areas throughout California. SOURCE: California Geologic Survey; 801 K Street, MS 14-33; Sacramento, California 95814

Local Geologic Maps

- AREAS MORE LIKELY TO CONTAIN NATURALLY-OCCURRING ASBESTOS IN WESTERN EL DORADO COUNTY, CALIFORNIA
  By Ron Churchill, March 2000
  Scale 1:100,000

- SERPENTINITE SURVEY OF LAKE COUNTY, CALIFORNIA – MAP A, ULTRAMAFIC, ULTRABASIC, AND SERPENTINE ROCK AND SOILS OF LAKE COUNTY, Adopted: March 2, 1992
  Scale: 1:100,000

Sources of USDA Soils Maps
Natural Resource Conservation Service
430 G Street. No. 4164
Davis, California 95616

California Department of Forestry and Fire Protection
6105 Airport Road
Redding, California 96002
www.fire.ca.gov

Open File Maps and Reports:

OFR 84-50 Mineral Land Classification of the Folsom [15'] Quadrangle, Amador, El Dorado, Placer, and Sacramento Counties, California. by Loyd, R.C.

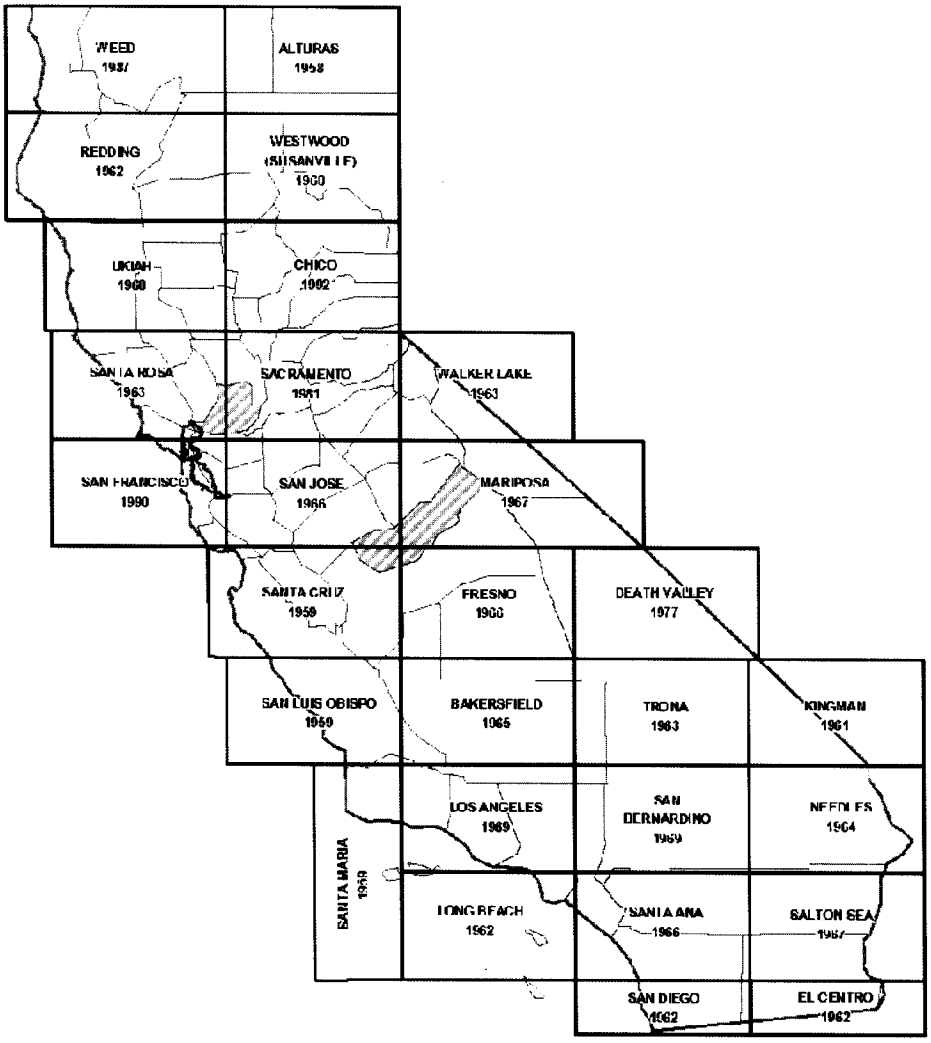
OFR 83-37 Mineral Land Classification of the Auburn [15'] Quadrangle, El Dorado and Placer Counties, California by Kohler, S.L.

OFR 83-35 Mineral Land Classification of the Georgetown [15'] Quadrangle, El Dorado and Placer Counties, California by Kohler, S.L.

OFR 83-29 Mineral Land Classification of the Placervill [15'] Quadrangle, Amador and El Dorado Counties, California by Loyd, R.C. and others

OFR 86-12 Mineral Land Classification of the Southern Half of the Bald Mountain/Browns Flat Gold Mining District, Sonora and Tuolumne Counties, California by Loyd, R.C.

INDEX TO GEOLOGIC ATLAS SERIES AND REGIONAL GEOLOGIC MAP SERIES MAPS



Counties in solid green contain ultramafic rock areas shown on the adjacent map. These areas are shown in more detail on the Division of Mines and Geology 1:250,000 scale Geologic Atlas and Regional Geologic Map Series maps. Madera and Solano counties, in diagonal pattern, have ultramafic rock areas shown on the Geologic Atlas and Regional Geologic Map Series maps that are too small to show on the adjacent map. Los Angeles County has small ultramafic rock occurrences on Catalina Island and a small occurrence is present in Kern County. Source: DMG Open-File Report 2000-19: A General Location Guide for Ultramafic Rocks in California - Areas More Likely to Contain Naturally Occurring Asbestos (DOC 2000b)

APPENDIX C

STATUTES AND REGULATIONS - ASBESTOS AND NATURALLY OCCURRING ASBESTOS

Federal Regulations

- Asbestos Standard for the Construction Industry. 29 Code of Federal Regulations (CFR) Part 1926.1101.
- Asbestos Standard. 29 CFR Part 1910.1001.
- Respiratory Protection Standard. 29 CFR Part 1910.134.

California Regulations

- CARB Section 93105-Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surface Mining Operations and CARB Section 93106-Asbestos Airborne Toxic Control Measure for Surfacing Applications. Authority cited: Sections 39600, 39601, 39650, 39658, 39659, 39666, and 41511; and Health and Safety Code. Reference: Sections 39650, 39658, 39659, 39666 and 41511.
- Cal/OSHA Asbestos Standard. Title 8, California Code of Regulations (CCR), Article 4, Section 1529, Article 110, Section 5208 and Article 2.5, Section 341.6 et seq.
- Cal/OSHA Injury and Illness Prevention Program Standard. Title 8, Sections 1509 and 3203.
- Owner Requirements. Business and Professional Code, Division 3, Chapter 9, Article 11, Section 7180 et seq.
- Hazardous Substance Removal Criteria. Health and Safety Code Section 25914.1-3.
- Asbestos Notification Act. Health and Safety Code Section 25915 et seq.
- Real Estate Disclosure. Health and Safety Code Section 25359.7
- Building Owners Responsibilities. California Labor Code Section 6501.9.
- California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65)
- Building Demolition. Health and Safety Code Section 19827.5.

County Regulations

The Naturally Occurring Asbestos and Dust Protection Ordinance; Chapter 8.44, El Dorado County Ordinance; Effective June 12, 2003

APPENDIX D

LIST OF ACRONYMS

APCD - Air Pollution Control District
AQMD - Air Quality Management District
ARAR - applicable or relevant and appropriate requirements
ASTM - American Society for Testing and Materials
Cal-OSHA – California Occupation Safety and Health Administration
CARB - California Air Resource Board
CCR - California Code of Regulations
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
DTSC - Department of Toxic Substances Control
ELAP - Environmental Laboratory Accreditation Program
HEPA - high efficiency particulate air filter
HSAA - Hazardous Substance Account Act
NIOSH – National Institute for Occupational Safety and Health
NOA - naturally occurring asbestos
O&M - operation and maintenance
PCM – phase contrast microscopy
PEA - preliminary environmental assessment
PEL - permissible exposure limit
Phase I - phase I environmental site assessment
PLM - polarized light microscopy
RAW – removal action workplan
RWQCB - Regional Water Quality Control Board
TEM – transmission electron microscopy
TWA - time-weighted average
USEPA – U.S. Environmental Protection Agency